The Outlines of Educational Psychology



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THE OUTLINES OF EDUCATIONAL PSYCHOLOGY

(*Third and Enlarged Edition*)

THE OUTLINES OF
Educational Psychology

An Introduction to the Science of Education

BY

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PREFACE.

The fact that we have had no general text-book in educational psychology has led to the preparation of this book, which is the outgrowth of the work with my own classes. I have endeavored to select for treatment those facts and principles of psychology, fairly well established, that have evident and direct bearing upon the problems of teaching. The time is at hand when every step in educational procedure must have scientific justification. This can come in the main from only one source,—the crucial test of experimental determination. If this volume contributes, in some small measure, toward the end of making education more scientific, I shall feel that its publication will be justified. It has been my aim to be careful and conservative, to keep within the warrant of established fact. However, I realize that nearly every page shows the need of more facts, more data. Experimental psychology is a thing of only yesterday; educational psychology is a new-born infant of today. But it is an infant of great promise. The army of trained investigators that is attacking the myriad problems of the school, will give us, even in a decade, results of great importance to education. But the work must be carefully done.

It is my belief that a text-book should be a mere outline, to be elaborated by teacher and students. The questions and exercises and the references will help toward this elaboration. The questions, for the most part, are selected

from those asked by my students when the matter of this book was presented to them in class. The references are to such English sources as I have found most helpful. They fall into two classes: (1) parallel systematic treatises and (2) the original reports of experimental work. In neither case, however, are the references complete. They are intended only on the one hand to refer the student to other, and often more extended, treatments of the same subjects, and on the other, to give the beginning student some idea of the nature of the investigations on which the statements of the text are based.

My indebtedness, direct and indirect, is great. Directly, I am indebted most of all, to Dr. W. L. Bryan, president of Indiana University, my first teacher in psychology; to Dr. E. B. Titchener, Sage professor of psychology in the graduate school of Cornell University, in whose laboratory I learned something of scientific method; and to Dr. G. M. Whipple of Cornell, who has shown the possibilities of applying this method to the solution of school-room problems.

Indirectly, my greatest debt is to President G. Stanley Hall and the late Professor James. My thanks are also due to President A. Ross Hill and Dean W. W. Charters of the University of Missouri, and to my brother, J. O. Pyle, of Chicago, who have read most of the manuscript and given valuable suggestions.

W. H. P.

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THE OUTLINES OF

EDUCATIONAL PSYCHOLOGY

Chapter I.

INTRODUCTION.

The educational situation.—The educational practice of the past has not been based on science as medical practice or good farming is now based on scientific principles. This, of course, does not mean that there has never been any good teaching. Long before there was a science of medicine many good remedies were discovered empirically, although little was known concerning the principles of drugs or the nature of their physiological action, nor was anything definite known concerning the nature and causes of disease. Now, however, medical practice has a scientific basis. Much the same can be said of farming. For thousands of years man has been tilling the soil, and by the slow trial and success method has learned many good practices, but he has not understood the nature of the forces with which he has dealt. He has not known what caused success or failure. The farmer of today can have sufficient scientific facts to make his procedure entirely intelligent. Although he can never have complete control of the conditions of his work, he can understand these

conditions, and can foresee the outcome of given situations.

The practice of education has had a similar history. We have had some great teachers in the past, but none of them has understood much of the real nature of what he was doing. If the great teachers themselves have known little of the nature of the material with which they dealt or the causes of their success, much less could their followers know. They could only imitate, with next to no knowledge of the principles which underlay their master's success. Systems of education have, for the most part, been based on some philosophical or religious conception. It is not correct to say that these systems have all been wrong; there has been, perhaps, some truth in all of them, just as there has been a grain of truth in most systems of philosophy. For example, some of Plato's ideas on education as expressed in the *Republic* can now be scientifically justified.

It has been impossible to have a science of education for the very simple reason that the data that must form a basis for the principles of such a science have not been at hand. What facts must be known before we can have a science of education? They fall into four groups: (1) the aim of education; (2) the nature of children; (3) the essential characteristics of the educational process, and (4) method, *i. e.,* the most economical procedure in attaining the first through the knowledge contributed by the second and third and by direct investigation made for this sole purpose.

The aim of education.—Society at any given time prescribes the type of individual to which it thinks

the children of that generation should be made to conform. Education is the institution of society that is to achieve that end, *i. e.,* train the children for action in accordance with the ideals of the times. Just what the type is, depends on the ideals of the age, and could be determined for any given time and people by studying their social ideals. The ideal individual leads such a life as conduces to the general well-being of society. At the present time in our own country there is pretty general agreement as to what this means. The adult male must support himself and family, and in his relations with his fellow men must so conduct himself as to lead to mutual comfort and happiness. It might seem that if this view of the aim and purpose of education is true, progress would be impossible. But such is not the case. The people of one generation can sometimes see that in some respect or other their relations and adjustments could be improved. It is then possible for them to bring up their children in such a way that the children, when grown, will come nearer to the better way of living. Education, then, is to achieve social efficiency; it is the conscious effort of society to give the young such information and such training as will enable them to produce ever a more perfect social life. And doubtless the ideal of social organisation will be that condition that will allow and make possible for all the greatest possible individual development of capacity to achieve and enjoy. Society exists for the individual and the individual exists for society, while education is the process of preparing the individual for his life in society and of making a better society. Every person who is to be a teacher

should be a student of the science of sociology in order that he may understand society and its institutions, their origin, their evolution and their function. A teacher without such knowledge can only grope blindly after an unknown object, but with such knowledge he can work consciously to achieve the highest social ideals.

The nature of children.—A child is a psychophysical being, that is, a being that is both mind and body. There are, therefore, two sciences that contribute the second group of facts for a science of education—biology and psychology. Biology tells us about the body, its organs and their functions, its growth and development and its evolution from lower animal forms. Psychology tells us about mind, its elements and the laws of their combination and organisation. Psychology tells us also about the development of individual minds and of the evolution of mind in the animal kingdom. That this second group of facts is necessary for a science of education is evident, for education is blind unless the teacher knows the laws of bodily and mental growth and function. The teacher must know something of nerves and muscles and their conditions of growth and activity; he must know something of the physical organs and the conditions of their healthy functioning. He must know something of sense organs and how to test their efficiency. He must know something of instincts, of habits, of perception, memory, imagination, feeling, association and attention. Accurate knowledge on these subjects is absolutely necessary for intelligent procedure in teaching.

The nature of the educational process. — The teacher must also know the exact nature of the educational process. What is taking place in the child when he is being educated? What is the child doing while he is being educated? What is possible and what is impossible? What is the function of the teacher? These and many more similar questions demand a scientific answer. Both sociology and psychology answer this question and both answer it in the same way, namely, in terms of adjustment. Sociology says education is the process by which young individuals are trained to participate in social life. From the point of view of psychology, education is essentially a process of habit-formation. The new individual is to be acquainted with this material and social world and trained in the appropriate responses to be made in all the varied situations of life. There are, of course, two aspects of education: (1) getting information about the world and (2) making the right response in the light of this information. But the second factor is the ultimate end, for we need the information only to guide action. If we did not have to move, to respond, we should have no need of sense organs, no need of mind. It has only been the growing complexity of movement, response, that has necessitated the development of sense organs through which we learn of the world. In this process of adjustment the function of the teacher is limited and his possibilities circumscribed. The utmost that he can do is to manipulate the environment of the child. Both biology and psychology tell us that the child comes to us with a body and mind inherited from his ancestors, with many definite responses already pro-

vided for in the neuro-muscular system. Heredity, then, sets the first limitation; we can work only within the limits set by heredity. And in a certain sense the child is unapproachable, unassailable, he can not be touched, he can not be changed; he is autonomous, he assimilates, he grows. Within certain limits we can change his environment. We can have something to do with the outcome of the child's actions in the way of pleasure and pain, we can make conditions favorable for the activity of one instinct or another, but more than this we can not do, and it is well that we know it. Education, then, is a process of adjustment that teachers and parents can partially guide and control by virtue of their power to change and manipulate the child's environment.

Method.—Sociology gives us the aim of education, biology and psychology give us the nature of the child, psychology explains the essential nature of the educational process. Psychology also gives us a scientific basis for method. Of course, method can sometimes be inferred from the nature of the child, so that the second group of facts, in the largest sense, would include the fourth, but the fourth group of facts deserves independent statement and treatment because every detail of method must have separate and indpendent determination by experimental procedure, although it is true that this procedure is always dependent upon the nature of mind. The best methods of teaching children to read, to spell, to write, to draw, to think, in a word to do all the various things that we want to learn to do, must be determined experimentally, for in very few cases can they be entirely determined by *a priori* considerations.

So complex are mind and its operations that the nature of every aspect of its operation must have independent determination.

Educational psychology. — The term *educational psychology* is to some extent a misnomer, for there is really only one kind of psychology, the science which undertakes to work out the structure, function and genesis of mind. Educational psychology, as now generally understood, treats of the application of the principles of psychology to education. It is, indeed, more than a chapter in applied psychology, and perhaps deserves to rank as a distinct subdivision of psychology. Psychology has for its problem the description of mind in general; this description it works out in its own way and in its own time as its purely scientific interests demand. Educational psychology takes over for its province that aspect of general psychology that has most immediate connection with education. The problems of the general psychologists arise out of the needs of the science as a whole; the problems of the educational psychologist arise out of the needs of education. The methods and procedure of the latter are, in general, the same as those of the former. Educational psychology, then, attacks a part of the problem of general psychology, and the only excuse for its existence as a separate subdivision is that education can not afford to wait upon the development of psychology as a whole, for psychology as such is not concerned with problems of education. However, since educational psychology has taken over a specific part of general psychology, its problems have taken on a specific character and its laboratory has its special

equipment. The educational psychologist must have the same training as the general psychologist, and, in addition, be familiar with the problems and conditions of the school room, for he is to be concerned with just those aspects of psychology that have closest connection with these problems and conditions.

Education and psychology.—By reference to our discussion of the four problems of education, it will be seen how much education must get from psychology, making educational psychology almost the whole of the science of education. The knowledge of the nature of the child must come in part from psychology, while the nature of the educational process and method must come almost wholly from psychology, and only in small part from biology. A detailed statement of the divisions of these problems will show the topics that are to be treated in this book. Our discussion of the nature of the child must include a statement of the facts of mental evolution and mental heredity, the order and laws of mental development, particularly the development of the instincts and all the various mental structures and functions,—feeling, perception, imagination, attention, memory, association, thought and action, especially of habits and the laws of their formation. The nature of the educational process will receive no further treatment than is given in the following paragraph, but many of the other topics discussed either directly or indirectly throw light on this question also. The scientific basis of method lies partly in the facts of mental structure, function and development, from which they are inferred or deduced, and partly

in the results of special investigations, which have for their sole purpose the experimental determination of economic methods of learning. We must also treat of method, not only from the point of view of general development, but also taking into consideration individual variation and abnormal types.

Education a process of adjustment.—Both psychology and biology, as well as sociology, consider education to be a process of adjustment. A consideration of the life of lower animals will make the meaning clear. Many, perhaps most, of the lower animals need no training; they come into existence with proper adjustments for life already provided for in the neuro-muscular system. Most of them have no infancy; from the first their life and life-adjustments are perfect and complete. Such animals do not have to learn, and, in fact, profit little by experience. But in higher animals, especially man, the young are born more or less helpless and with their responses more or less imperfectly adjusted; they have a period of infancy, during which they acquire the proper adjustments to the environment; in other words, they have a period of plasticity, during which they acquire knowledge of their environment and training in the proper responses to make to it. The long infancy in man is one of the chief factors that give him his conspicuous advantage over the lower animals. Sociology tells us that infancy, by making necessary the development of the family, has made our civilisation possible. From the point of view of genetic psychology, infancy is no less important, for it serves as a period for training in adjustment. The only limitation to this training is that set by heredity, *i. e.*, by

inherited structure and the instincts. Within these limits a wide variation of adjustment is possible. Almost any response can be formed for any situation. Without the period of infancy, adjustment to our complex modern life would be impossible. But with this period the only limit to social progress is, as we have said, that fixed by heredity. Life itself is adjustment, and education is the perfecting of adjustments during the early years of life. It is therefore a process of training in adjustment and of perfecting and fixing the adjustments. It has, as already pointed out, two aspects: (1) impression and (2) expression. Training consists in receiving impressions and learning and perfecting expressions. Knowledge and habit are, therefore, the two poles of education. From this point of view parents and teachers become guides for the child, and should take him by the hand and lead him through all the varied natural and social environment, and, by controlling and manipulating this environment, guide and determine the responses and adjustments formed by the child. But, as pointed out already, this is the utmost that can be done. What the child becomes is the resultant of two forces, the child and the world. The teacher can to some extent determine what this world shall be, but this is all.

QUESTIONS AND TOPICS FOR FURTHER STUDY.

1. Is it true that the people of any community are agreed as to the qualities or attributes of an ideal citizen? Are they agreed as to the studies that should be pursued in school?
2. Make out a list of the twenty characteristics you consider most desirable in an American citizen. Arrange them in the order of their importance. Name five characteristics on which there is

not general agreement. Would the savage American Indian have agreed to your list of twenty characteristics? Will your list be acceptable 5000 years from now? What changes, in this respect, have you undergone in your own lifetime?

3. Does adjustment to surroundings mean submitting to these surroundings without modifying them?

4. Is there any conflict between the interests of the individual and those of society?

5. Is society itself merely an institution existing for the good it may do for the individual?

6. Does psychology have anything to say about the characteristics of the ideal citizen? About the aim of education? Are there any facts that tell us the kind of individual that we ought to be? Why, for example, do you think people should be honest and truthful?

7. Can the development of the individual be made the aim of education?

8. Should a child's training in adjustment to his environment be equal for all parts of this environment? What rule can you give that will cover this matter?

9. If our ancestors throughout all the past have got along without a science of education, why can we not still get along without it? Why will not the methods of rearing children of 10,000 years ago be adequate at the present time?

10. Mention some defect in educational procedure due to ignorance. Point out some defects in your own home or school training due to ignorance of parents or teachers.

11. Name some pioneers in the field of educational psychology.

12. Name some specific points on which information would enable you to make a better teacher or parent.

13. What is the significance of the terms "willing" and "able" in Münsterberg's definition of the aim of education?

14. If a person does not *do* as well as he *knows*, what defect in his training does this indicate?

15. Mention some principles of education held by Plato that can now be scientifically justified.

REFERENCES.

On the educational situation, G. Stanley Hall, *Educational Problems*, 1911, the introduction.

For discussions of the aim and nature of education:

H. Münsterberg, *Psychology and the Teacher*, 1909, Ch. ix. (From the point of view of the philosopher.)

M. V. O'Shea, *Education as Adjustment*, Chs. iv and v.

W. C. Bagley, *The Educative Process*, 1905, Pt. 1.

N. M. Butler, *The Meaning of Education*, Ch. 1.

F. E. Bolton, *Principles of Education*, 1910, Ch. i.

J. W. Jenks, *Citizenship and the Schools*, 1906. (From the point of view of the political economist.)

H. H. Donaldson, *The Growth of the Brain*, 1895, Chs. xviii and xix. (From the point of view of the physiologist.)

C. A. Ellwood, *Sociology and Modern Social Problems*, 1910, Ch. xv. (From the point of view of the sociologist.)

C. W. Eliot, *Education for Efficiency*, 1909, Ch. i, Education for Efficiency; Ch. ii, The New Definition of the Cultivated Man.

The Significance of Infancy:

John Fiske, *Excursions of an Evolutionist*, Ch. xii, or in *The Destiny of Man*, Ch. iv and v, or in *Outlines of Cosmic Philosophy*, Vol. ii, 344.

A. F. Chamberlain, *The Child*, 1900, Ch. i.

On the relation of Psychology to Education:

E. L. Thorndike, *Journal of Educational Psychology*, 1910, Vol. i, p. 5.

E. A. Kirkpatrick, *Journal of Educational Psychology*, 1910, Vol. i, p. 76.

G. Stanley Hall, *Adolescence*, 1904, the preface; also Vol. ii, pp. 496-497.

H. Münsterberg, *Psychology and the Teacher*, 1909, Chs. xi and xii.

John Dewey, *Psychological Review*, 1900, Vol. vii, 105.

William James, *Talks to Teachers*, 1899, Ch. i.

Chapter II.

BODY AND MIND.

The background of psychology is biology, and although our interest here is strictly psychological, certain biological presuppositions and considerations, as well as certain psychophysical relations, are necessary to make our treatment of mental development fully intelligible.

The evolution of the body.—"The doctrine of evolution merely states that the animal world as it exists is naturally developed out of the animal world as it existed yesterday." It is only a statement of the fact that the temporal relations of phenomena are causal; the events of today grew out of the events of yesterday, those of yesterday out of those of the day before, and so on back. The animals of today are the natural descendants of the animals of the past, the plants of today of the plants of the past; in fact, the inorganic, as well as the organic, world is believed to proceed causally from one phenomenon to another. Gravitation and evolution are twin conceptions that bring order out of chaos, put meaning into otherwise meaningless facts. The law of gravity merely states the fact of the orderly arrangement and relation of things in space, and the law of evolution states the fact of the orderly arrangement of phenomena in time. They might very well be called the laws of the orderly arrangement of phenomena in time and

space. We must, of course, bear in mind that a *law* for natural science is no more than a shorthand statement of the relationships and uniformities that exist in a body of facts.

The old view of the world was static. Events were looked upon as more or less independent and the result of chance. Few men even dreamed of the great, underlying, interpenetrating relationship existing among all things. History was largely the chronicling of unrelated events; science, a catalogue of unrelated facts. Species of animals and plants were supposed to have originated separately and independently, each the result of a special creation. The actions of man were supposed to be the result of his own capricious choice, uncaused. In contrast with this view of the world, the present view may be called dynamic. We look upon all things as in flux, yesterday flowing into today and today flowing into tomorrow. Nothing is uncaused, order pervades all things. A complete understanding of the conditions of one situation is the full explanation of the next situation. This view now pervades all thought in science, philosophy, literature and history. In fact, the dynamic view is a presupposition of all science. The mind of the scientist thinks in terms of evolution. To illustrate: the historian of today no longer hunts for facts merely, but for underlying movements and tendencies on which the events float as leaves upon a river. The naturalist of today sees in species only the resultant of the interplay of environmental forces, acting upon the species of the past. We have called the static view *old* and the dynamic view *modern;* but it must be said that the dynamic view was

known and held by many ancient Greek philosophers. It did not, however, enter into the general thought of mankind till modern times. Darwin's *Origin of Species* was published in 1859, and this date may be considered to mark the beginning of a movement which has revolutionised modern thought. It is not our purpose here to enter into the proofs of evolution—for this the reader must go to biology—but only to state the modern view in order to point out its educational significance.

The evolution of the mind.—The evolution of the mind is, in a sense, a correlate of the evolution of the body. The brain and nervous system have developed along with the complexity of body structure. There can no longer be any doubt that mind has developed from great simplicity among lower forms of animals to the more complex mental activity of the higher animals and man. In the animal kingdom as it now exists we find mind in all its various stages of development. And if we study the mind of any single human individual we find it at first relatively simple, and acquiring day by day new structures and functions quite analogous to the development of the body. To any one who makes such a study there can be no question of the development of the individual mind, for it takes place before our very eyes. And everything that we know about mental life points to the evolution of mind in general. And just as the evolution of the body is a presupposition of the biologist, so the evolution of mind is a presupposition of the psychologist.

Evolution and education.—It is very important that teachers have the evolutionary point of view,—

that they see in the child the product, the outcome of the past. They must know that the race has been hammered out in the forge of nature, that the child bears in its every feature the imprint of the past. The teacher must know that the same forces and conditions of the environment that have brought about the development of the race still act upon the child. If these forces and conditions have brought us up out of savagery, they must at least be the starting point for modern education, for our bodies and minds presuppose these conditions.

The doctrine of evolution must enter into the general philosophy of the teacher and be a part of his mental equipment. In addition to this general effect of the doctrine, we are indebted to it for several specific aspects of modern education either for their origin or justification. (1) Sequence of development in the life of the child, which makes education possible, is a part of the conception of evolution. This is the notion of recapitulation, which is a biological fact, and, in a broad sense, a psychological fact. Every stage of development is conditioned by the previous stage and the environing forces. This is due to the accumulated experience of organic forms, and doubtless is as true of mind as of body. Therefore, the necessity of orderly procedure in education has its explanation and justification in evolution. (2) Activity in education, which lies back of manual training and gymnastics, has its full explanation in evolution. In the past it was the response of the individual to the pressure of the environment that brought about progress, and *a priori* we should expect such response still to be a condition of prog-

ress and development. The facts seem to show that this is true. Evolution gives us an interpretation of this fact. (3) The modern nature-study movement has its justification in the doctrine of evolution. The movement is merely a recognition of the fact that we can not neglect *now* the natural and physical conditions that have made possible the development of the race. Man has always had the closest relations to his natural environment, and it would be strange indeed if he could now afford to neglect it. (4) Moral training has no meaning except when considered in the light of the evolution of ethical and social ideals. But there is no use to specify details, for every phase of education takes on a new aspect, acquires new meaning and significance, when considered in the light of evolution.

Body and mind.—It is already obvious from our discussion that mind and body are very closely related. It will be well, however, to notice in some detail certain aspects and consequences of this relationship. (1) First one should notice the mere fact of relationship. We know nothing about mind except in its relation to bodies. The exact nature of the connection between them we do not know—we may never know—but we may sometime be able to give a pretty good description of it. We know now that every variation and fluctuation of mind has its corresponding variation and fluctuation in the body. It does not seem just correct to say that either is the cause of the other,—that the mental change causes the physical change, or that the physical causes the mental; so in the present state of our knowledge we say merely that the two sets of phenomena go on

together and are inseparably connected. (2) The intimate relation of the mind is with the changes in the brain and nervous system. There seems to be a complete parallel between intelligence and brain development throughout the animal kingdom; the more complex the brain-structure, the higher the intelligence of the animal. Not only, then, is mind related to body, but it is more especially and intimately connected with nervous activity. (3) It is possible to consider the body of an animal as a mechanism, a mechanical structure greatly differentiated, with parts especially sensitive to certain types of impressions. These sensitive structures are all connected with muscular structures, and impressions on the former bring about responses in the latter. This may all be considered as a mechanical process, but while certain parts of this process are going on, namely, the action in the brain cells, set up directly or indirectly by the impressions on the sense organs, there is *consciousness.* We need not concern ourselves in this book with the metaphysical question whether consciousness is a causal element in the physical series. This makes no difference to education. What the teacher ought to know is that the body may be considered purely as a mechanism, but that the development of the mind is invariably associated with the development of the mechanical processes, and that whatever the ultimate nature of the relationship may be, it is surely a most intimate one. (4) The mind, as we saw, is dependent upon brain structure and function; intimately associated with brain activity is muscle activity. We have, then, *mind, brain, muscle,* the great psychophysical trinity,

the three-in-one, existing in the most intimate relationship, mutually depending, directly or indirectly, the one upon the others, each having no meaning without the others. (5) It seems that in the past muscular activity has made the development of our brain necessary, and it is a reasonable assumption that muscular development still has an intimate connection with brain development and therefore with mental development. (6) From the point of view of the body it is the muscles and nerves that are trained and educated, and the training consists in the perfection of muscular movement as related to nervous stimulus. (7) Another thing to be noticed is the complete dependence of mind, at least in man, upon sense organs. These organs are specialised nerve-endings, each type capable of receiving a certain sort of physical impression. They are the means through which the environment brings about brain changes,—the necessary accompaniment of mind. This fact makes (8) the hygiene of the sense organs of the greatest importance to the teacher. A child without any sense organs would not have enough mind to quarrel about. And a child's mental life is incomplete if any sense-organ is defective or abnormal. It is therefore essential that the teacher know the sensory equipment of the children under his charge, and that school authorities have accurate tests made of the sense organs of the pupils and have medical attention and help given when necessary. It is not only useless to proceed, as teachers, in ignorance of these facts, but it is criminal, for every child has the right to demand of society that all possible be done for his individual development. (9) We must not lose sight of the fact

that muscular activity is not only the *condition* of mental development, but the *end* as well. There seems little reason, ultimately, why we should *know* except that we may *do*. Knowledge is not itself an end, but only a means, only one step in the complete process of education. Education has suffered greatly in the past because of ignorance or forgetfulness of this fact. Whenever a teacher forgets that action, adjustment, is the end of training, then education begins to be formal and severs its relation to reality and life. It has too often been true that the work of the school room was artificial and had little relation to the life of the time, when, in fact, it ought merely to be an aspect, an expression, of the life of the time, as the outgrowth of that of the past. (10) Under this view, manual training and industrial education take first rank in the curriculum and become the cornerstone of the educational structure. (11) The sharp distinction and separation of mind and body in the past has been a great error. There have been people who thought that the mind had little use for the body, and who have humiliated and degraded the body. We now see that this is a great mistake, for in order to look properly after the development of the mind we must look most carefully after the bodily conditions.

QUESTIONS AND TOPICS FOR FURTHER STUDY.

1. In what sense is the doctrine of evolution new if many great thinkers from the time of Thales have held it in some form? What led to the general acceptance of the doctrine in the latter part of last century?
2. Does the child of today, on account of evolution and heredity, have greater capacity to learn than was possessed by children a hundred years ago? than the children of twenty thousand years ago?

3. Is man still undergoing evolution? Will he probably acquire a new sense that he does not now possess?

4. Outline the evidence on which the doctrine of evolution is based.

5. Is there any evidence at all that stands in the way of accepting the doctrine?

6. Why should we distinguish between evolution and theories of evolution?

7. Explain the following terms: Darwinism, natural selection, survival of the fittest, Weismannism, Lamarckianism, spontaneous variation, the DeVries mutation theory.

8. To what extent does the mind of an individual pass through stages of mental development analogous to the minds of lower animals?

9. Is the snail a mere mechanism or does consciousness accompany its muscular activity?

10. Is it true that we have as much right to use the term 'cause' to designate the relation of mind to body as we have for using it to designate the relation between two physical phenomena?

11. What is meant by 'free will'? determinism? From what point of view can we say that we *do as we please?* From what point of view can we say that our acts are all *determined?*

12. Is it true that strong minds are found in weak bodies? If you know of such a case, can you explain it? Look up the biographies of a dozen great men to see what you can learn about their early life.

13. How can you account for rather mature minds in immature bodies? and how explain immature, undeveloped minds in mature bodies?

14. What important bearing on education has the fact that the development of the body is absolutely essential to the development of the mind?

15. Why is it that American schools have not used play and games to the full extent of their possibilities?

16. Professor Swift tells us in *Mind in the Making* that many great men in this country and England were slow in their development, got little benefit from their attendance at school and were considered weak-minded by their teachers. What explanation can you give?

17. Look up the biographies of eminent men and see if you find that as many of these men were precocious as children as were backward.

18. What motives have induced school authorities to put manual training into the schools?

19. If mind and body are so closely related, can we say that all education is education of the mind?

20. What is meant by 'hygiene of the mind'? Is there any hygiene of the mind apart from the hygiene of the body?

21. G. Stanley Hall says that school hygiene is the most important part of pedagogy. In what sense is this true?

22. Is your own body in good condition? Are your eyes and ears perfect? Would there be as good reason for requiring teachers to pass a physical examination as there is for requiring them to pass a mental examination? Do you know of any cities that require teachers to pass a physical examination?

23. To what extent should teachers be prepared to examine and test the pupils as to their physical health and sensory capacity? Should some training in medicine and nursing be part of a teacher's equipment?

24. Describe simple tests for determining visual and auditory defects. Give illustrations of the effects on life and character of such defects.

REFERENCES.

The evidence of the evolution of organic forms is the whole science of biology, and specific references are almost out of the question, and since no student should undertake the study of educational psychology without at least a general knowledge of biology, such references are unnecessary. The general nature of this evidence, however, may be found in such books as:

J. LeConte, *Evolution; its nature and evidences and its relation to Religious Thought*, 1891.

H. F. Osborne, *From the Greeks to Darwin*, 1902.

General text-books in zoology.

A good notion of the significance of the doctrine of evolution may be obtained from the essays in the commemorative volume, *Fifty Years of Darwinism*, 1909.

On the evolution of mind, see the article on *Evolution and Psychology*, by G. Stanley Hall, in *Fifty Years of Darwinism;* also, E. L. Thorndike, *The Evolution of the Human Intellect*, in *Popular Science Monthly*, 1901, Vol. lx, 58.

E. A. Kirkpatrick, *Point of View of Genetic Psychology*, *Journal of Ed. Psy.*, Vol. i, 76; *Genetic Psychology*, 1909, Ch. xi.

On the relation of mind and body: H. Münsterberg, *Psychology and the Teacher*, 1909, Chs. xiii and xiv.

E. B. Titchener, *A Textbook of Psychology*, 1910, pp. 9-15.

On the dependence of mental development on muscular development: Hall's *Adolescence*, Ch. iii.

H. H. Donaldson, *The Growth of the Brain*, 1899; is a book that emphasizes the importance of the brain and nervous system in education.

On mental and physical examination and medical inspection: G. M. Whipple, *Manual of Mental and Physical Tests*, 1910. Tests of sensory capacity, Ch. xi. *Questions in School Hygiene*, 1909; very helpful in the study of school hygiene; gives extended references on all aspects of the subject.

L. H. Gulick and L. P. Ayres, *Medical Inspection of Schools*,

1910. A splendid treatment of the subject. The student is especially referred to the first three chapters for a general treatment of the subject, and to chapter viii for examinations of vision and audition.

Any good text in school hygiene gives directions for tests of sensory capacity. See such as those by Barry, Hope, Newsholme and Shaw.

J. M. Taylor, *Motor Education for the Child*, *Pop. Sci. Mo.*, lxxviii, 268; L. M. Terman, *The Relation of Manual Arts to Health*, *Pop. Sci. Mo.*, lxxviii, 602.

V. L. Kellogg, *Darwinism Today*, 1908; M. M. Metcalf, *An Outline of the Theory of Organic Evolution*, 1904; E. B. Poulton, *Essays on Evolution*, 1908; H. de Vries, *Species and Varieties: Their Origin by Mutation*, 1905.

Chapter III.

HEREDITY.

What we mean by heredity.—If we apply heat to a duck's egg, a duckling will hatch from the egg; if the heat be applied to a hen's egg, then a chick hatches from the egg. We never have any doubt about the outcome if we know what kind of egg the heat is applied to. If we plant corn, and the proper amount of heat, air and moisture is available, the seed sprouts, produces stalks and eventually ears of corn. If the seed planted is wheat, then wheat grows from the seed. An acorn produces an oak and not an elm. Here, again, we have no doubt about the outcome if we know what kind of seed is planted. Such popular expressions as "like father, like son"; "chip of the old block," etc., make it clear that it is the popular belief that the same rule holds good with mankind, that if we know the parents, we can predict with considerable confidence concerning the offspring. It seems to be a universal principle in the organic world that like produces like. The new being is not *exactly* like its progenitors; there is always some variation, but the new growth is, as a rule, more like that from which it came than it is like the forms in other lines of descent.

Heredity is a necessary corollary of evolution, for after natural selection has eliminated the unfit, the

characteristics of the fit must be transmitted to the next generation. One of the fundamental characteristics of organic matter is irritability. This means only that the mechanical and chemical effects of the environing forces bring about a readjustment of the organism. For progressive development to be possible the organism must retain some trace of this readjustment that will make the same reaction likely when the same stimulus is repeated. *This likelihood of the same response to the same stimulus is the fundamental fact of heredity.*

The mechanism of heredity.—The first problem set by heredity is that of its mechanism. How is the transmission of characteristics accomplished? In the lower forms of animals—the protozoa—the problem is fairly simple. The protozoan's body is comparatively simple and relatively homogeneous. The single cell merely divides to produce a new individual. After the division, each of the new animals is composed of parts of the various simple structures of the parent animal, and retains whatever tendencies to response the parent had. In a certain sense there is no heredity among these lower forms, because there is no real reproduction here. One animal merely divides into two or more animals, and each of the new animals possesses the characteristics of the parent form, for in a sense they *are* the parent. Only two principles, then, are necessary to account for heredity among the lower protozoa: (1) internal forces of the organism adjusting it to the forces of the environment; (2) the formation of habits, *i. e.*, the fixing, by repetition, of types of response. The responses which an organism gives to definite stimu-

lation are made definite by repetition; the result of this fixing may be called organic habit.

Among higher forms of animals the problem is more complex. The body is differentiated into various complex substances and structures, and reproduction is not accomplished by the simple division of the parent form. However, although the problem here is more complex to work out in detail, it is ultimately the same as in the lower forms and involves only the same two principles. All higher animals come from a fertilized cell or egg. This single cell develops into the complex structure of the adult animal. Of course, the differentiation of special reproductive tissue and body tissue, and the production of the latter by the former, presents a special group of problems. Various hypotheses have been advanced to account for the facts,—such as Darwin's pangenesis theory, Weismann's germ-plasm theory, the preformation theory, and what might be called the dynamic theory,—the view that each step in the developing individual is conditioned by the environment. For discussion and criticism of these theories the student must be referred to biology.

Recapitulation and heredity.—One fact of heredity, fairly well established, is that the individual in its development proceeds through successive stages analogous to the stages passed through in the evolution of the species. This fact has its explanation in the two facts of heredity mentioned above. The cell from which the higher animal develops possesses the traces or effects of the past environment of the animal's kind and the responses to that environment; therefore, if the proper conditions are supplied to

the developing cell it responds—in its adjustment—step by step in harmony with the tissue of which it is a part. In other words, a developing animal responds to the environing forces according to the habits of response fixed by the continued responses of its ancestors. Such, briefly, are the facts of the mechanism of heredity,—simple enough in outline, but it may be a long time before the biologist can give us the facts in detail.

The laws of heredity.—(1) Galton's law. The statistical studies of Sir Francis Galton and others seem to indicate a tendency toward mediocrity. Tall parents have children taller than the average, but not so tall as the parents; similarly, the children of short parents are shorter than the average, but not so short as their own parents. The children of unusually intelligent parents are above the average, but not so intelligent as their parents. This means that the offspring tend to approach a type. Statistics seem to indicate that this is true. The fact is usually known as Galton's law, and is stated as follows: The immediate parents contribute one-half of the hereditary tendency of the offspring, the grandparents one-fourth, the great-grandparents one-eighth, and so on back. Now, while statistics indicate a tendency toward an average or type, it is quite likely that the facts are much more adequately accounted for in other ways. (2) Mendel's law, perhaps, expresses a more fundamental fact. Recent studies of heredity indicate that physical characteristics are transmitted as *unit characters,* and that this transmission is pure. For example, if yellow and white corn are mixed or crossed, the first crop will be all

yellow, but if all the seed of the second crop is planted and allowed to cross, one-fourth of the next crop will be white, and if planted separately will breed true, with no yellow product, showing the pure transmission of the unit character, *white,* although the white corn had been crossed with yellow. This principle of transmission has already been found to cover a large number of cases, and may ultimately be proved to be a general law of physical heredity of wide application.

Mental heredity. — Are mental characteristics transmitted in the same way as physical? From what we know of the intimate relation of mind and body, mental heredity becomes a natural and legitimate inference from the facts of physical heredity, since the nervous structures that underlie mental traits and tendencies doubtless are inherited. The few studies that have been made on mental heredity corroborate this inference. However, the detailed facts of mental heredity have yet to be made out. It may be a reasonable conjecture at this stage of our knowledge that mental traits are transmitted by heredity in just as true a sense as are physical traits, and we may even guess that there are unit characters of mind corresponding to unit physical characters, but this is a mere guess, and there is practically no evidence at this time to support it.

Special facts of heredity.—(1) Atavism. Occasionally children are born possessing some peculiarity not now common, but supposed to have been a common attribute of remote ancestors. This reappearance of old characters is known as atavism. Examples are extra digits, hairy or horny skin, etc. When

these characteristics appear, they usually persist in the offspring for several generations. There is a record of six generations of horny-handed people in France. (2) Disease not inherited. It seems to be established that diseases are not inherited. They may be transmitted by infection from mother to offspring before birth, but not inherited in the true sense. (3) Acquired characteristics not inherited. In the present state of our knowledge it looks as if the past ages of our experience have given the germ-cell such inertia or momentum that little, if any, effect is produced on the germ-development by the life of the immediate parents before the germ begins its development. It is perhaps impossible for any effect to be produced, for early in the development of the individual the reproductive tissue is differentiated from the body—or somatic—tissue. The body tissue supplies it with nourishment, but is helpless to produce other effects than those that proceed from good or poor nourishment. The effects of our education and training are not transmitted to our children, but the neuromuscular structures that make our own training possible are transmitted to them. Any spontaneous variation of the germ-cell making possible unusual education and training is doubtless transmitted by heredity, and this is an important fact for education, for it amounts to the same thing as the transmission of our acquirements. Although the child can not inherit the learning of his father, he may, perhaps, inherit the capacity for such learning. The only bad thing is that the young must go through the learning process, and this may not be without its blessing.

Social heredity. — Although acquired characters are not transmitted, the fact that children live for many years with their parents and gradually take on the beliefs, manners, customs, traditions, and even the politics and religion of their parents, largely takes the place of such transmission. This means of coming into possession of the social products of civilization is known as *social heredity*. It is not heredity in the same sense as the other form of transmission that we have discussed, which may be called *natural heredity,* but since the result is to make children like their parents and elders in social habits, social heredity is a very appropriate term. We learn to speak, write, and in general act as our parents do, much as if instincts for these performances were inherited. The attainments of parents and adults generally are handed down to the children of the generation through social heredity. This influence is almost as certain and definite as natural heredity. We are born into a system of social relationships, and through imitation we learn to play our part in these relationships. However, the only field left open for social heredity is that not covered by inherited instincts, except that there is a certain possibility of modifying these instincts through social pressure. It may be said that the strength and definiteness of social heredity is inversely proportional to that of natural heredity. The old, individualistic instincts are least affected by social pressure. The importance of social heredity is due to two facts: (1) the long period of infancy and (2) the strength of imitation during early life. During the long period of infancy the child is plastic and takes on the form of activity that

he sees about him. He continues to imitate what he sees till the response becomes a fixed habit and a part of his nature, approximating instincts in definiteness and regularity. By the time that we reach maturity, social pressure, acting upon our inherited instincts, has moulded us into the sort of responding organism that we are to be through life, the acquired habits being largely matters of reflex response and under the control of the centers of the spinal cord. So the importance of social heredity, within the limits of its possibilities, is about as great as that of natural heredity.

Educational inferences. — (1) The tremendous force of heredity. We are more alike than we are different. The older racial traits are the strongest, and the fundamental characteristics of our race are measurably the same for all of us. These common factors of heredity may be presupposed by education. (2) The great importance of small differences. It is the fact that we are, on the whole, alike that gives to small variations their great importance. Small differences may ultimately mean a fool, on the one hand, or a genius, on the other. A favorable environment may mean the saving of the fool, helping him to become self-supporting and keeping him out of the poor-house or prison; while an unfavorable environment may make of him a criminal or pauper. It is also in the interest of society to favor, in every possible way, the development of any unusual capacity in an individual. (3) Eugenics. This term may be defined as the science of improving the human race by breeding. It undertakes to discover the laws of heredity and consciously to apply them to the improvement of the

human stock. It may hope at least to conserve the small favorable variations and to some extent eliminate the unfit. (4) The development of social ideas now renders largely impossible the elimination, by natural selection, of the socially unfit. Therefore, the only way to eliminate them is to make their *origin* impossible. The importance of the study of heredity, with the idea of discovering its laws and applying them to the improvement of the human race, is very great. Teachers should, therefore, lend their influence to social measures looking toward the study of heredity by the pure and applied sciences.

QUESTIONS AND TOPICS FOR FURTHER STUDY.

1. Distinguish between facts and theories of heredity.
2. Write a brief statement summarizing the main facts of heredity.
3. What aspects of heredity do we try to account for by theories? What theory seems to account best for the facts?
4. Make a study of your own physical and mental inheritance. Consider height, hair and eye color and such mental traits as you can get data on. Do you find any evidence of Galton's law, of Mendel's law?
5. Do you find in your study any evidence of the transmission of eye defects; of any other physical defects or deformities?
6. Collect statistics showing the inheritance of mental traits. Can you eliminate the effects of training and imitation on the traits studied?
7. Can you trace the inheritance of specific traits to your mother, to your father, to a more remote ancestor?
8. Is there any specific branch of study in which you inherit either superior or inferior ability? Can you eliminate the effects of training and imitation?
9. Collect statistics showing that genius is the result of nature, and not nurture. Can you cite evidence that seems to show the contrary?
10. Is it probable that many unusual minds are lost to society on account of an unfavorable environment?
11. Discuss the following statement of Thorndike's: "The one thing that educational theorists of today seem to place as the foremost duty of the schools—development of powers and capacities—is the one thing that the schools or any other educational forces can do least."—*Ed. Psy.*, 1903, p. 45.

12. Make a list of mental characteristics that are little affected by the schools.

13. From the point of view of heredity, how may we state the function of the schools?

14. Is it possible to determine the relative influence of heredity and environment in the case of the Jukes family?

15. Collect evidence showing the outcome of raising children of poor parentage in good environments; be sure of your facts concerning the child's parentage.

16. Cite facts showing that we are not all equal by birth.

17. Should the schools undertake to discover the natural capacities of individuals and educate accordingly? If a person has ambition for a career in a certain field, but has little capacity in that field, should he be encouraged to carry out his ambitions in that direction? Should everyone be given a higher education? Does society have any right to set any limitation to the pursuits of an individual?

18. Do you know of any cases of atavism or reversion?

19. Make a list of the characteristics that you have as a result of social heredity.

20. Mention several things in the line of race improvement that the State is warranted in doing now. Cite examples of the propagation of the grossly unfit.

REFERENCES.

For Brief General Treatment:

E. L. Thorndike, *Educational Psychology*, 1910, Chs. v and vii; E. A. Kirkpatrick, *Fundamentals of Child Study*, 1909, Ch. xv.

On the Biological Aspects of Heredity:

J. Loeb, *The Dynamics of Living Matter*, 1906; E. B. Wilson, *The Cell: Its Development and Heredity*, 1896; H. B. Orr, *A Theory of Development and Heredity*, 1895; A. Weismann, *The Germ Plasm*, 1893, especially part 1; G. J. Romanes, *An Examination of Weismannism*, 1899, especially chapter iii; H. de Vries, *Species and Varieties: Their Origin and Mutation*, 1906, *The Mutation Theory*, 1910; G. A. Reid, *The Principles of Heredity*, 1905, from the point of view of a physician; J. A. Thompson, *Heredity*, 1908; D. C. Punnett, *Mendelism*, 1911.

On Mental Heredity:

F. Galton, *Hereditary Genius*, 1892: *Natural Inheritance*, 1894; *Noteworthy Families*, 1906; E. L. Thorndike, *Educational Psychology*, 1910, pp. 77-103; *The Measurement of Twins*, 1905; K. Pearson, *Nature*, Vol. lxv, p. 118.

On Social Heredity:

J. M. Baldwin, *Mental Development*, Vol. ii, p. 57; E. A. Kirkpatrick, *Fundamentals of Child Study*, p. 297.

On Nature versus Nurture:

E. M. Elderton, *On the Measurement of Resemblance of First Cousins*, 1907; *The Relative Strength of Nurture and Nature*,

1909; F. A. Woods, *Mental and Moral Heredity in Royalty*, 1906; also in *Popular Science Monthly*, Vol. lxi, 369, 449, 506; Vol. lxii, 76, 167; H. Ellis, *A Study of British Genius*, *Pop. Sci. Mo.*, Vol. lviii, 595; Vol. lvix, 59, 209, 266, 373, 441; R. L. Dugdale, *The Jukes*, 1902; A. E. Winshop, *Jukes-Edwards, A Study in Education and Heredity*, 1900; W. S. Church and others, *The Influence of Heredity on Disease*, 1909; E. L. Thorndike, *Heredity, Correlation and Sex Difference in School Children*, 1903, p. 41, in Columbia Conts. to Phil., Psy. and Ed., Vol. xi, No. 2; *Notes on Child Study*, 1903, p. 146, *Educational Psychology*, 1910, pp. 138-141.

On Eugenics:

K. Pearson, *The Groundwork of Eugenics*, 1909; *The Scope and Importance to the State of the Science of National Eugenics*, 1909; *The Problems of Practical Eugenics*, 1909; also in *Pop. Sci. Mo.*, Vol. lxxi, 385; F. Galton, *Pop. Sci. Mo.*, Vol. lxxi, 165; C. B. Davenport, *Eugenics*, 1910; *Eugenics and Euthenics*, Pop. Sci. Mo., lxxviii, 116; W. E. Kellicott, *The Social Direction of Human Evolution*, 1911; C. Davenport, *Heredity in Relation to Eugenics*, 1911.

Chapter IV.

INSTINCTS.

Definition and description.—Instincts are definite, complex forms of inherited response to definite stimuli.* The stimuli may be definite situations in the environment or definite changes in the body of the animal. Through heredity, these responses have become fixed in the organism. The basis of instinct is inherited structure. The co-ordination of a particular form of response with a particular kind of stimulus is already provided for in the neuromuscular structure of the animal possessing the instinctive tendency, so that when the appropriate stimulus appears the appropriate response, rather than some other, takes place. An illustration will make the matter clear. The building of a nest the first time by a bird, say an oriole, is instinctive. Certain changes in the oriole's body, that may have some relation to seasonal changes, is the stimulus. The oriole sets to work and builds a nest of definite type, without ever having learned how, and without ever having seen one built before. When the nest is made, the eggs are laid in the nest rather than somewhere else. The mother bird sits upon the eggs and hatches them, feeds the young and protects them,—in a word, the whole process of brooding is performed without the

*Although instinct is here defined as a form of action, the term is occasionally used in the text to designate the impulse or tendency.

mother bird being taught how. Instinctive actions, then, are those that an animal can perform without having to learn how. As a rule, they are performed well the first time, provided that the inherited structure underlying them is sufficiently developed. If a young bird is thrown out of its nest before its muscles and feathers are sufficiently developed, its flying is poor and awkward, but if the bird is sufficiently developed it flies well on the first day of its flight.

We have said that instincts are definite forms of response, but there is variability from zero fixity on the one hand, to almost absolute fixity, on the other. The oldest instincts are, as a rule, the most fixed and definite and least variable, while those forms of instinctive action latest acquired in the history of the race or species are, as a rule, the least definite and most variable. Instincts that lead to self-preservation and self-protection and to the preservation of the species are, on the whole, the most fixed and invariable. Natural selection, acting through unnumbered ages, has perfected instinctive responses. For every form of animal life the individual gets along best, on the average, by a certain type of response to the various situations that the species has to meet. Natural selection perpetuates those individuals that give this response and eliminates those that do not. A study of the animals as they exist in the world today shows a most delicate inherited adjustment to those conditions of the environment that are the most general and constant. To the less general and constant factors the inherited forms of response, if any, are less constant and more variable. In a strict sense, there is perhaps never absolute invariability of inherited

response, but there is an approach to it, and the nearness of this approach marks the strength of the instinctive tendency.

Instincts differ from reflex action in the matter of complexity only, for they are alike in both being inherited forms of action or response. The term *instinct* is reserved for the more complex adjustments involving usually a series of reflexes,—the latter being simple responses usually of single muscles or a single group of muscles. Winking the eyelid, for example, is a *reflex;* the building of a nest is a series of reflexes or an *instinct.* But, as responses, their only difference is that of complexity. While instincts differ from reflexes in the matter of complexity, both differ from habits in the matter of origin. Habits, too, are more or less definite responses to definite situations, but the definiteness of the habit is acquired and is due to repetition in the lifetime of the individual.

Experimental studies of instinct.—Our knowledge of instinct has been greatly enlarged in recent years by systematic observations and experiments carried on by the zoologist, as well as the psychologist. Among the first experimenters was Spalding. Some of his experiments with chickens show very clearly the nature of instinct. He found that young chicks could peck accurately without having to learn how. Before they were four days old, chicks would follow any moving object, but if kept hooded till about the fourth day they would then flee from any moving object. He found that chicks could find their way to the mother hen by the sound of her cluck alone, although their ears had been kept previously cov-

ered with wax. The chicks would hide from hawks the first time that they heard a hawk. Chicks chirping in the shell would stop chirping on hearing the warning note of the mother hen. Although chickens may be kept with turkeys, they continue to catch flies in their own inherited way rather than in the better way used by the turkeys. A young chick will run away with a morsel of food, although no other chick be near to interfere. Numerous experimental studies show that not only in the chick, but in all animals, most of the responses that are necessary to survival are provided for in the inherited organism. When the time is ripe the action is performed without the necessity of learning it. Only a little observation is needed to show that mammals, the highest of animal forms, perform most of the important functions of life without learning. A lamb will walk within one minute after birth; a colt within twenty minutes. The sucking reflex is usually ready to function at birth. And so on through the list of what the animal must do,—locomotion, taking food, the various responsive relations to parents, to enemies, and to the different natural surroundings,—earth and air and water, light and darkness, weather conditions, etc.,—for each a form of response is ready. If it is not ready at birth, it is ready when the need arrives.

Instinct in man.—Man has as many instincts as the other animals, perhaps more. There are instincts of fear, fighting, sucking, walking, imitation, play, instincts concerned with reproduction, others concerned with social life, and so on through a long list. Man is a creature of instinct and habit. It is true, he is also a creature of reason, but how much there is

of instinct and how little of reason! What is not instinct is, in large measure, habit. The great and powerful sources of our daily action lie deep in our nature,—love and hate and fear, jealousy and rivalry, competition and strife, and the instinctive responses characteristic of them, are as old as the hills, while our little spark of reason is but a thing of yesterday and today. Our bodies have come down from the past; they have been moulded in the woods, and their equipment is that which led to the survival of our ancestors in their form of life. It is, therefore, no wonder that we find the strongest forces of our nature to be the heritage which these ancestors have left us, and, of course, suited to primitive forms of living.

Transitoriness and periodicity of instincts.—Some instinctive tendencies seem to be transitory, as the instinct of following moving objects in the chick as mentioned above. It seems that the developing structure of the animal provides a certain kind of response for a certain stimulus and situation, but if the appropriate stimulus and external conditions are wanting when the structure is ready for them, the tendency to definite form of action in this situation passes away. If the mother hen and chick are together for the first ten days of the chick's life, the chick responds to the mother's call, but if they are not together, then the chick "hears the call as if it heard it not"; it pays no attention to its mother. Instinctive fear is not present in many mammals at birth, and when fear does appear it is not manifested toward that surrounding to which the animal has become accustomed in the meanwhile, but is manifested toward strange

things. If a cow hide her calf away for the first two or three weeks, it is then very difficult to tame the calf. Many such acts, as the burying of bones by dogs, of nuts by squirrels, are doubtless never performed unless the conditions are favorable for the performance when the instinctive tendency first ripens, although we need more extended studies on this subject before we can know the exact facts. Many instincts show a certain periodicity of occurrence, such as instincts concerned with reproduction that recur periodically, and instincts that concern the animal's relation to its seasonal environment, that bring about migration, hibernation, etc. Concerning the transiency of instincts in the developing child, we have not yet sufficient exact knowledge to speak with entire confidence, but as far as our knowledge goes it looks as if transiency were a very prominent characteristic of the instincts of children. Their varying interests seem to be manifestations of their changing and developing instincts.

The order of development of instincts.—One of the most important factors that must be worked out for the science of education is the natural order and sequence of the developing instincts of children. The task will require the long and patient work of many psychologists, but enough has already been done to show that the problem is solvable; in fact, to a considerable extent, is solved. We shall know presently the natural orderly development of children; we shall know the normal ages of the child for the first appearance of the different instincts, the conditions of their future growth or atrophy, their relations to environmental conditions and their mutual inter-

dependence. We know these facts already in broad outline. The order of development has been fixed by natural selection and is that best adapted to the conditions of life in the later existence of our race. To some extent, the order in the individual may be the same as the order in racial development, but this need not at all be the case, for the appearance of instincts doubtless shifts up and down the age scale according to the changing conditions and demands of the life of the species. There can be little doubt, however, that the present strength of an instinctive tendency depends upon its age and function in the history of the species. On the whole, the motives which lead to self-preservation and self-protection are much stronger than sympathetic and altruistic motives. The dependence of instincts upon external conditions is great and their interrelations are important. The development of many instincts is largely dependent upon that of others, and unless the proper environmental conditions appear the instinct, in many cases, will not become perpetuated in the individual's life. Although we have few studies on the matter, it seems that there is a most favorable time for fixing and perpetuating an instinct in an individual. The child passes through various stages of natural interests, when his whole energy seeks an outlet in one direction, and there can be no question of the necessity of taking advantage of these successive waves of natural interests which underlie inherited action, *i. e.,* instincts. We must "strike while the iron is hot." Teachers worry a great deal about how to interest children in this or that. This worry

is wholly unnecessary and fruitless. A teacher can no more give a child an interest that he does not have than he can add to his own stature "by taking thought." And the earlier that teachers learn this, the better for their teaching. What the teacher should have is (1) a knowledge of what kind of thing the child should finally be and (2) a knowledge of the proper manipulation of the child's environment to lead to the fixing and perpetuating of the desirable instincts and the inhibition and final atrophy of the undesirable ones. It may very well be, however, that many, perhaps most, of the undesirable instincts should be allowed some activity because of their relation to the development of other instincts that are desirable. The facts and details of these matters must be known to the teacher. The chapters which immediately follow undertake to state these facts as far as we at present know them. It needs only to be said here that the instincts seem to have, each, its most favorable periods for development.

Early specialisation of instincts. — It was noted above that the chick at first will follow any moving object about it. This is usually a hen, but may be a dog or a man, but whatever it first follows, this it continues to follow until it learns to look out for itself. This early specialisation of the stimulus seems to be a feature of many instincts. At first, any one of a number of things or situations may call forth the response. What the first stimulus is may be largely a matter of chance, but afterwards the chance initial connection becomes permanent to the exclusion of other originally possible connections. It may

be a matter of a particular kind of food, a particular home, a particular route, etc. In birds we have examples of periodicity in their mating, selecting one bird rather than another and sticking to this partner through the season. It appears that at first the nature of the stimulus for a particular kind of response is generic. Any one of the genus may call forth the response, but very soon the response becomes associated to a particular one of those possible. Although the happy maiden says that a certain man is the only one in the world that she could possibly live with, she is pretty far from the truth, for almost any one of the other billions would do just as well. It is largely a matter of chance which one is first thrown in her way, which one first calls forth the response of love. The girl thinks that the forces of the universe have been at work through all eternity fashioning for her the *one man*. So they have, in a sense, but if she had lived in the next ward or the next county, the man would have been a different one. But after chance has once brought them together, the love of other men is in large measure inhibited. This general fact of the specialisation of stimulus is important for education, because of the large range of possibilities in what one may love or hate or fear or seek or imitate, or collect or fight or kill. Herein lie the possibilities of the parent and teacher, for they can determine and arrange the environment, throw this or that into the child's way, take this or that out of the child's way. While the child instinctively responds to what is there, the response may be associated with desirable features of the environment rather than with unde-

sirable ones. Although no man can touch a child, although the child is impregnable, unassailable, still we can, within the limits set by heredity, tremendously affect the child's development by our manipulation of its surroundings. The child grows according to the laws of its own nature, but we can in some measure control its surroundings, which call forth its actions, and thus indirectly affect its growth and development. More than this we can not do, but a knowledge of what the child is by nature and of the order and laws of its growth puts immense possibilities into our hands. These possibilities slip away the moment we forget what children are by nature.

Classification of instincts.—Various classifications of instincts have been used, all more or less artificial and arbitrary. Perhaps the best basis for classification is the necessities that have occasioned and perpetuated the instinctive tendencies. On this basis we have (1) the individualistic instincts, those arising out of the demands of individual life, such as the responses connected with fear, combat, rivalry, competition, obtaining food, escaping enemies, etc. (2) Socialistic instincts, those arising out of the demands of social life, those that bring about the survival of the group as well as that of the individual, such as the instincts associated to sympathy, co-operation, etc. (3) Sexual or parental instincts, those arising out of the necessities of sexual life, such as those connected with courtship, mating, home-building and the rearing of young. (4) Those instincts necessitated by the fact of growth and development in the life of an individual and made possible by the period

of infancy. They may therefore be called adaptive or developmental instincts, such as play and imitation, the former being necessary for normal growth and the latter enabling the individual to learn his environment and become adapted to it. (5) There are what we might call the environmental instincts, those that have been necessitated by the changes of seasons, climate and food supply, such as collecting, migration and hibernation. These might be very well included under the individualistic instincts, but the latter are primarily those that function without regard to time or place, while the instincts of this class are entirely necessitated by periodic changes of the environment. However, we attach little importance to any classification of instincts, for the needs of the species are at bottom the basis of all of them. Some writers have made still another class, namely, the moral instincts, but it is very doubtful whether there is any such thing.

QUESTIONS AND TOPICS FOR FURTHER STUDY.

1. Compare the various definitions of instinct given by psychologists and zoologists with the one given in the text. What two types of definitions do you find?
2. Enumerate the instinctive actions of a dog, of a child. Which is the longer list?
3. Discuss Loeb's theory of the nature of instinctive action. Do you think it can account for the most complex instincts?
4. Is the walking of a child instinctive? Answer from your own observations, and also consult Major, *First Steps in Mental Growth*, p. 348, and Kirkpatrick's *Fundamentals of Child-Study*, pp. 79-81.
5. State the aim of education from the point of view of the instincts.
6. Do the instincts of a race of people differ from age to age? Do the different races at the present time have different instincts?
7. Do instincts play as important a part in the life of the human individual as they do in the life of the lower animal?

8. Can you give any evidence of an animal losing the ability to perform such a basic instinct as flying or walking?

9. Can you give any evidence to show that moral or religious acts are instinctive?

10. If the instincts of all children are about the same, what constitutes their individual differences in ability and capacity?

11. Is the first response, in the case of any particular instinct, complete and definite, or does it show development in this regard? Compare various instincts of different animals on this point.

12. Is there any instinctive element in speech?

13. Is it possible by controlling the environment to prevent the appearance of an undesirable instinct?

14. Give evidence to show that instincts at present undesirable are important in the development of the individual.

15. Can you give any evidence to show that an instinctive tendency in a human individual can disappear from disuse?

16. Are the lower animals guided entirely by instinct; *i. e.*, are all their acts instinctive?

17. Are instincts still being developed in the human race?

18. Is instinctive action always blind, or is there sometimes foresight of the end? Can you cite any evidence of an instinct being modified by experience?

19. Can you tell anything about the instincts of extinct animals by an examination of their fossil remains?

20. Is a person's action dependent more upon instinct than upon reasoning and thinking?

21. Make a list of all the human actions, that you notice in a day, that you consider instinctive.

22. Make a list of your actions for a day, classifying them under the headings *instinctive, habitual, result of choice or reason.* Which is the longer list?

23. In what sense are our instincts the basis of all our acquirements?

24. What is the relation of the instincts to feeling? What is the James-Lange theory of the emotions?

25. Should our educational systems be so reconstructed as to have a basis of instinctive interests?

26. Give evidence to show that instincts and instinctive interests in the human child are transitory, and show the importance of this fact to education.

27. Give examples to show that in great crises and extreme situations of life, the culture and polish of our young civilization is likely to give place to old and fundamental instinctive actions.

28. Our instincts fitted us for our primitive life in the woods. Do they fit us as well for our life in the modern city? Is there any reason for saying that the child is, by nature, bad? If so, in what sense do we use the term *bad?*

REFERENCES.

W. James, *Principles of Psychology*, 1896, Vol. ii, Ch. xxiv; E. A. Kirkpatrick, *Fundamentals of Child Study*, 1909, Chs. iii and iv; H. R. Marshall, *Instinct and Reason*, 1898; C. L. Morgan, *Animal Life and Intelligence*, 1895, Ch. xi; *Habit and Instinct*, 1896; G. J. Romanes, *Animal Intelligence*, 1892; Eric Wasmann, *Instinct and Intelligence in the Animal Kingdom*, 1903; J. Loeb, *Psychology of the Brain*, 1903, Ch. xiii, a good discussion of the physical nature of the basis of instinct; E. L. Thorndike, *Animal Intelligence*, 1898; A report of the early experimental work of D. A. Spalding, in *Popular Science Monthly*, Vol. lxi, p. 126; an interesting series of articles by F. H. Herrick on *Instinct and Intelligence in Birds*, in *Pop. Sci. Mo.*, Vol. lxxvi, p. 532; Vol. lxvii, pp. 82 and 122; Jordan and Kellogg, *Animal Life*, Ch. xiv, a very good brief statement from the zoological point of view; C. H. Judd, *Psychology*, 1907, Ch. viii.

Chapter V.

THE INDIVIDUALISTIC INSTINCTS.

Number and nature.—The individualistic instincts are many, including the inherited responses associated with ambition, rivalry, pugnacity, pride, fear, feeding, escaping danger, and all other inherited responses related to individual survival. An examination of their nature shows their evident fitness for primitive conditions of life. The tendencies for these responses appear in children with tremendous strength, as every parent knows. We try to cover these instincts up in the polite society of modern times, but every child shows unmistakably by its selfishness, pride, jealousy, combativeness, unreasonable fear, greediness, and so on through a long list, familiar to every despairing parent, the long experience of the race in the school of nature. Consider, for example, a child's table manners: long and persistent efforts are necessary to suppress the savage instincts and to establish fairly decent habits. Without this careful training, children act at the table much as do pigs at their trough. Even as it is, in the best of homes, the selfish nature of the child is at any time likely to burst forth. The child wishes to eat his pie first, wishes to know if he may have more when "this is gone," and whether there is any more. The child complains because a brother or sister has the biggest piece of cake, or more of this or that, than

he has. In the matter of play, these instincts show themselves strongly. Children can not play long together in peace, or allow other children to play with their toys. They claim to be bigger, stronger, older, richer, etc., than their playmates. Years of training enable an adult to cover up these old tendencies, to some extent, under ordinary circumstances, and the later socialistic instincts show considerable strength; but let an unusual situation appear, and much too often *down* goes the civilised man and *up* comes the savage, as it was with the man on Cayuga lake, some summers ago, when the burning boat was about to sink. Seizing one of the few available life-preservers and jumping overboard to swim ashore, he cried: "Fifty dollars to any one who will save my wife!" Setting forth the strength of these old instincts does not mean that we are not to try to subdue our savage nature, but that a consideration of their tenacity may show that long and persistent training is necessary to form habits that function on a higher level than these instincts. Instinctive responses that lead to self-preservation must be strong in all species that survive. Only in rare cases does any motive prove stronger in crucial situations than that of self-preservation. But these cases do occur, although rare, in the love of parent for child, in devotion to duty and to truth. For these, many men have sacrificed their lives. Mankind has always regarded these acts as the noblest of deeds.

The child tries to turn everything to his own good and interprets everything in terms of self. Of course, there are exceptions, especially in the child's relation to his parents, but the child learns to identify his own

interests with those of his parents, and learns that he does not suffer from competition in that quarter. In most situations the individualistic instincts are strong in the child, and are the only instincts on which we can in general depend. It could not be otherwise, for these instincts bring about the child's development. Of what use would social instincts be before the child has any capacity to help others? The individualistic instincts, together with the adaptive, which are essentially individualistic, are therefore our starting point in education. On them as a basis stand the higher instincts and in them lies the possibility of training. They doubtless stand back of most of the achievements of man. If competition, rivalry, curiosity and self-interest were taken out of the world, there might be little left in the way of achievement, and it would probably be a pretty colorless, insipid sort of world. We shall now examine in some detail a few of these important instincts.

Fear.—The instinctive responses to fear are old and fundamental, and although we now have little reason for fear, still, especially in the child, there exists an unreasonable fear that will not down,—the survival of untold ages of conflict with tooth and claw and the strange, mysterious forces of nature. The instinct appears in the infant very early. The babe jumps at sudden sounds and at loud sounds. There is early a fear of falling, that soon passes away. There are also periods in early childhood when the child seems to be fearless, at least toward many aspects of nature, and later comes a time when it is fearful of nearly everything, *i. e.,* fear shows the phenomena of transiency and periodicity mentioned

in chapter IV. It has been a source of much interest and amusement to notice these periods in my own children, V and W. While W was three and four years old and V was five and six, the older boy was much afraid of worms, snakes, bugs, etc., and W showed no fear toward them. V would therefore get W to catch these animals and manipulate them for study. Some years earlier V showed as little fear as did W at this time. I am not at all sure about the regularity and universality of this phenomenon, but of the general fact of periodicity in the development of fear there seems no doubt. A young child will show absolutely no fear toward, say, a toad, but a year later, without in the meantime having any unfavorable experience with toads, perhaps without even seeing one, will show fear toward them.* Experience seems to have much to do with determining what shall call forth the fear response. An early unhappy experience with a dog, for example, will make it difficult or impossible for the person later to overcome a great fear of dogs.

It is a question whether there is any specific object of fear as a matter of heredity. It would seem as if reptiles, fire, water, darkness and some other things excite instinctive responses, but we can not be sure. Since there is little reason for fear in modern life, the instinct is weak in many adults, but there are very few people who do not have some weak spot, some unreasonable, and often inexplicable, fear. However, if we have all the facts in a person's life, we can usually explain these cases, for often it is a matter of the specialisation of stimulus. Some early,

*See James' *Principles of Psychology*, Vol. II, p. 417.

intense experience causes the same stimulus to function all through life in evoking the fear response. An early unhappy experience with a fire that got beyond control bids fair to have a lasting, unreasonable influence on one of my own children, and I know of several similar instances of permanent fear of fire.

The manifestations of fear are many. There are changes of respiration, of the rate of heart-beat and circulation and various outward responses, such as running away, crying out, and even remaining still, as if paralyzed.

The pedagogy of fear.—(1) *On the part of parents.* My own experience and the experience of hundreds of my students whom I have questioned convince me that fear is an important factor in the life of children. Ignorance or carelessness on the part of parents may cause the fixing and perpetuating of some instinctive fear that often causes much agony throughout childhood and in some cases throughout life. To illustrate, when I was a very young boy a horrible story of a sleeping woman being awakened at night by a madman who had been asleep under the bed was read to me. The story was illustrated, and for years the image of that picture, showing the terrorised woman and the madman, functioned at night to call forth a blind, instinctive fear. That early experience,—the result of the thoughtlessness of an older brother,—caused me more agony than I like to think of. In nearly every one that I have questioned there is recalled some early experience that had tremendous after-effects. In view of these facts, it seems certain that parents should exercise great care concerning the early experiences of their chil-

dren. Take, for example, such a phenomenon as a thunder storm. If, during the storm, the fears of the children are quieted, if parents are calm and unconcerned, children will acquire an attitude of indifference toward these phenomena that will save them much terror in later life.

(2) *On the part of teachers.* In the history of education fear has, perhaps, been more universally appealed to as a motive than has any other aspect of child-nature.* The child has performed his tasks because of fear of pain that would ensue if the tasks were not performed. Since escaping pain, real or imaginary, has always been at the bottom of fear, the teacher has, therefore, been appealing to an aspect of human nature that could be depended upon to function at least as long as the danger of pain was imminent. But true to its nature as an instinct, when the cause of fear was removed, fear disappeared, and no motive for study remained. In these days teachers try to find many other sources of motive that have a wider range of application and that will function at all times. However, it may be that we can still make considerable legitimate use of this old and strong aspect of human nature on a higher plane than that of mere physical pain. It may be very legitimate for a child to work because of fear that he will break a previous good record, or that he may lose the good will of teacher or parent. Of course, even these motives should not be the main reliance of a teacher, but they are legitimate. It is even proper for fear of physical pain to function on occasion. Nature has made great use of the sense of

*See Hall's *Youth*, p. 339.

physical pain in the past, and it is by no means certain that we can yet afford entirely to dispense with it.

Pugnacity or the fighting instinct.—If a teacher doubt the instinctive nature of the manifestations of anger or fighting, let him try the experiment of entering into a harangue — in apparent seriousness — against the character of Roosevelt or Bryan, meantime watching the faces and actions of his students. Their faces flush, their teeth set, their eyes 'glare,' their breathing is interrupted, and if they be allowed to reply it is seen that they have lost control of their voices; in a word, it is quite evident that a number of students are ready to fight for their hero.

The responses due to anger lie back of much of history and literature. The wrath of Achilles gave us the Trojan war and the *Iliad;* the wrath of cruel Juno gave us the wanderings of Aeneas and the *Aeneid.* In later authentic history, trouble and wars unnumbered have come because of unreasonable anger wholly of an instinctive nature, because of the calling forth of the savage, prehuman, blind desire to fight. Even now as this page is being written the good people of our country are debating the question of the fortification of the Panama canal! But why mention particular cases, when every schoolboy knows that all the nations of the earth are taxing their people to the point of starvation in order to be ready at a moment's notice for *mutual destruction!* So strong is the fighting instinct in man that there are few individuals who are not ready to fight, provided that their neighbor steps on their particularly sensitive corn,—perhaps their religion, politics, an-

cestors, personal failings, their children, or perchance their chickens.

Causes of anger.—In general, anything interfering with one's procedure, one's happiness, evokes the fighting response. Usually we have some particular "anger zone," some particularly sensitive spot, as mentioned above, that never fails to arouse the tiger within us. These zones are widely different in different people. I have several times taken a census of my classes and found such as the following: seeing the strong impose on the weak, to have others meddle, thwarting of purpose, maligning of friends, seeing a person persuading another to do wrong, to hear cursing, to have one's failures mentioned, seeing bright red, seeing people smoke, seeing affection displayed publicly, to see disrespect, to see others masticate, to see a horse mistreated, cheating, deceit, etc. What interferes with our pursuits and our happiness angers us, and since these pursuits are different for all of us, different things call forth our anger.

Manifestations of anger. — Anger in children is shown by such phenomena as biting, scratching, gnawing the teeth, making 'faces,' stamping, swallowing, frothing at the mouth, butting and pounding with the head. There are also such changes in involuntary movements as change of heart-beat and breathing. The voice roughens, especially in older people. Children often snarl like wild animals and show their teeth and bite like a dog. Whether this is a matter of imitation or of heredity would be difficult to say without further study.

Control and treatment.—Children can and should be taught a measurable degree of control of at least

the more violent outbursts of anger. Hall tells us that one function of education is to train and tutor the savage mind, and for this purpose recommends plain talks and spanking, and, as prophylactics, good health, work and regularity. Simple methods are—to gain control of the voice, drop the jaw, relax the muscles, pause and reflect and give inhibiting ideas time to rise. Different people have adopted various ingenious means of working off the surplus energy usually manifested in anger, in such ways, for instance, as sawing wood, playing the piano, biting the finger nails, chewing a toothpick or a nail. Much wisdom is needed in dealing with angry children. Sometimes they should be neglected, sometimes spanked, and should be allowed to suffer the consequences of their angry acts when these lead to the destruction of playthings and other property. How to deal with fighting among boys is a serious problem. Hall thinks that physical combats in certain periods of a boy's life are necessary to develop manliness and self-respect, but this is very doubtful. It may be developing a good deal higher type of manhood for a child to learn self-control and to restrain his savage passions. However, in the present diversity in the manner of bringing up children it would not do for an individual parent or teacher to forbid fighting absolutely. But if there were a general agreement among the people of a neighborhood that the children should not fight, it is very doubtful that any lack of manliness would result from the absence of fighting. At present, about all that can be said is that teachers and parents should assume the attitude that fighting is not proper, but should not absolutely

prohibit it, and then deal with each case that comes up, on its merits. Certainly, in our modern society we do not consider it necessary to 'smash' our neighbor's nose (except in the rarest of instances) in order to maintain our honor. We consider it rather a poor kind of honor that has to be maintained in that way. Therefore, unless it can be shown to be essential to individual development, fighting should not be fostered in children. And to satisfy the purposes of individual development, doubtless the instinct can be given activity in some direction other than physical encounter. It will be a bad thing for civilisation if the fighting spirit ever dies out, but there are plenty of means for its development; there are plenty of things in our modern society that need 'smashing' quite as much as our neighbor's nose, and that require a good deal more courage in the operation. Therefore, Hall is stating a more important truth when he says that we should teach the child to know the things that should arouse his righteous indignation.

Competition in the school room.—Competition is based on the fighting instinct. The proper use to make of competition in the teaching process is a serious question, but there are certain facts that can guide us in its solution. There can be no question of the strength of the incentive of competition, but the value of its use should be determined by comparing the results obtained from its use with those obtained by using other incentives. If a teacher or parent can appeal to the instinct of competition without injury to the disposition or character of the children, then its use is legitimate. But there are certainly serious

dangers. If a child does something merely to beat someone else, then it means that he is happy in his own success and his neighbor's failure. Is this a trait that we wish to develop in modern society? It certainly is not. We no longer believe that we must succeed at the expense of our neighbor, but that our mutual success is best for both of us. While this is true, it is by no means certain that we can afford to give up all forms of competition. If an instinct so strong and so universal as that of fighting can be utilised, we certainly should lay hands on it, provided that we can do so to the ultimate good of the individual. This is possible, and competition can have at least a subsidiary function as a motive. Group or class competition can often well be used without injury; one can compete with one's own record, and even with one's fellows, to the end of bringing forth the best efforts of each, as is done in sports, without glorying in the defeat of one's fellows. It sometimes happens that to be beaten by a fellow will arouse a boy or girl to put forth the best that is in him or her when nothing else will, and at the same time there will be no resentment toward the victorious champion that put them on their mettle. Much depends on the wisdom of parents and teachers, and those with tact and judgment can make much use of competition without injury and without making it either the chief means or the end of education.

The only individualistic instincts not more or less closely associated with fear or the fighting instincts are those connected with feeding. The latter are of no great educational importance, and are not treated here.

QUESTIONS AND TOPICS FOR FURTHER STUDY.

1. Make out a complete list of the human individualistic instincts.
2. Give incidents from your own experience or observation to show that in time of crises individualistic tendencies are likely to prove stronger than any other. Have you observed any exceptions?
3. What is there in our laws relating to the punishment of murder that takes account of the strength of individualistic instinctive tendencies?
4. Make out a list of all the things that excite fear in you. Which of these fears can you explain? For which ones have you no explanation? Can you trace any of these fears to the actions of your parents? How many of your fears can be traced to an unhappy early experience?
5. Are you afraid to walk alone at night through a cemetery? What is the basis of our fear of the supernatural? Have supernatural agencies ever injured our ancestors? Did a ghost ever hurt anybody?
6. Make a study of the fears of children and see if you can verify the statement of the text in regard to the pedagogy of fear.
7. Have you outgrown any fears of childhood? How could a person be cured of some unreasonable fear?
8. Are all children, regardless of their treatment, at some time afraid of the dark? Does it do any good to explain to a child that there is nothing to be afraid of?
9. Explain the fear of engines, automobiles and other things that were not common to our ancestors.
10. Compare the necessities of fear at the present time with the necessities of fear in the primitive life of man.
11. Write an account of the fights of your childhood, stating their causes and their results. Do you consider the results beneficial to you?
12. Can a child's 'will' be completely subdued? Is such a result desirable?
13. Is it better for a child to have too much or too little regard for and confidence in himself?
14. Compare the control exercised over the individualistic instincts by the untutored savage and by a high type of civilized man. On the other hand, cite the acts of an American mob that are on a par with those of the primitive savage.
15. Did you ever want to kill anybody? Did you ever plan to do so?
16. Why are most individualistic instincts considered bad? Show that they were fortunate possessions under primitive conditions.
17. Would you prophesy a happy or an unhappy future for a boy of seven who is distinguished because of his tendency to resent any trespassing upon what he fancies are his rights? Contrast with

this type the one that rarely offers opposition to the aggression of playmates or others. (O'Shea.)

18. Are the boys that make the highest marks in school the best fighters on the playground?

19. Under our modern social conditions, does the person that is always fighting accomplish the most? Compare Presidents of the United States in this regard.

20. As you look upon it now, what was the effect of competition on your life in childhood?

21. Indicate the legitimate and illegitimate uses of competition in school work. Is it a good thing for people to meet failure and be defeated occasionally? Can you recall instances in your own life when failure did you good?

22. A boy can run faster in a race than when running alone. Is a like thing true when applied to his studies?

23. Point out instances showing the bad effects of unconditionally forbidding fighting. See H. D. Marsh, *Point of View of Modern Education*, 1905, p. 70, for an example.

24. Give your experience with group competition. Can you cite instances to show that friendly rivalry with good feeling is possible and good?

REFERENCES.

On Fear—E. A. Kirkpatrick, *Fundamentals of Child Study*, Ch. vi, p. 99; G. Stanley Hall, in American Journal of Psychology, Vol. viii, p. 147; E. Barnes, *Studies in Education*, Vol. i, p. 18; H. M. Stanley, *Psychological Review*, Vol. i, p. 241; *American Journal of Psychology*, Vol. ix, p. 418; M. W. Calkins, *Pedagogical Seminary*, Vol. iii, p. 319; W. Preyer, *The Senses and the Will*, 1895, p. 164; J. Sully, *Studies in Childhood*, 1895, Ch. vi.

Adolescence, Vol. i, p. 451; Vol. ii, p. 370; B. Perez, *First Three Years of Childhood*, 1892, p. 62; A. E. Tanner, *The Child*, 1904, p. 219.

On Anger and the Fighting Instinct—G. Stanley Hall, *Am. Jr. Psych.*, Vol. x, p. 516; *Adolescence*, Vol. i, pp. 220 and 354; Vol. ii, p. 367; *Educational Problems*, p. 251; B. Perez, *First Three Years of Childhood*, 1892, p. 66; M. V. O'Shea, *Social Development and Education*, Chs. vii and viii; F. L. Burk, *Teasing and Bullying*, in *Pedagogical Seminary*, Vol. iv, p. 336; A. E. Tanner, *The Child*, 1904, p. 216; G. Ordahl, *Rivalry, its Genetic Development and Pedagogy*, in *Ped. Sem.*, Vol. xv, p. 492.

Chapter VI.

THE SOCIAL INSTINCTS.

The chief social instincts are gregariousness or the gang instinct, responses connected with the emotion of sympathy, including altruistic responses and simple forms of co-operation, and certain responses of instinctive nature that are connected with the love of approbation.

Gregariousness or the gang instinct. — Children naturally desire to be with other children. It makes no difference how well occupied or how contented a boy may be; the sight of another boy or group of boys is quite enough to disturb his peace of mind. He immediately prefers to join the other boys and play with them. Parents are sometimes shocked when they first discover that they are not all-sufficient for their children, that their children prefer children rather than their own parents as playmates. There seems no question that children, if free from adult interference, are responding to a natural desire and perhaps to a natural necessity when they come together to play. Although the individualistic instincts are so strong that in the early years of childhood play is seldom harmonious for long at a time, nevertheless the gang instinct is at work and gradually gains the ascendency over the individualistic tendencies, the latter to some extent becoming subordinate to the former. The trouble that children

of the present day have in getting along together is, perhaps, in large measure due to parental interference and meddling. If the children were allowed to settle their own matters in their own way, they would doubtless get along much better than they do. A certain form of stability and equilibrium would be established and maintained. Moreover, the fights that primitive children engaged in were doubtless fitting preparations for the life that they were to live.

As far as we have any direct knowledge, considerable association with other children seems to be necessary for the normal development of a child. However, it is well toward adolescence before the tendencies that lead to co-operation are strong enough to enable children to sink their individuality and work for the good of the group,—club, gang, school, team, class, or whatever the social group may be. Children often form clubs, doubtless in imitation of those of older children, before the social tendencies are sufficiently strong to hold them together. The result is usually not a happy one; the children quarrel and get along badly because they can not put the interests of the group above their own desires. Just before adolescence, however, the tendencies underlying the gang instinct are strong enough to enable a club to hold together for a season. The clubs and gangs that are formed in later childhood and youth as a result of these tendencies, and from other causes discussed in a later paragraph, furnish one of the important problems to the teachers of our towns and cities, and to some extent to those of the rural schools as well.

Chums.—Chumming is, perhaps, a specialised expression of the gang instinct, and deserves separate consideration. Investigation reveals the fact that most children at some time or other have chums. In chumming, each child suffices for the other, often to the entire exclusion of other children. It is a common thing in the school room to see two children who wish to be constantly together; when play-time comes, they seek each other's company and care not for the society of other children. This is not best for young children, as we shall see when we come to study the instinct of imitation. Whatever be the merits of any child, they are not sufficient to constitute a social environment large enough for any other child. The effect of chumming on young children can not be other than narrowing and leads to exclusiveness and snobbishness. Sometimes the stronger child dominates the weaker one, leading him into mischief. Among older children, chumming often causes neglect of duties and thoughtlessness toward others. Chums care not for the rest of the world, for they are self-sufficing, as they think, but in the end this certainly can not be so, at least for young children. There are, nevertheless, certain good things that come from having a close chum. Among the good influences that have been mentioned by my students as a result of their chum experience are the following: (1) the gaining of higher ideals from a chum; (2) one person supplements the character of another; (3) as a result of the supplementing of character, one chum acts as a check on the other; (4) teaches unselfishness; (5) broadens by teaching the value of friendship; (6) chum stimulates to ef-

fort. Doubtless much depends on the temperament, character and age of the people concerned. It may very well be that in later youth the experience may be very beneficial to both concerned. A strong child may be of great help to a weaker and get as much help himself by virtue of helping his friends. In later adolescence, after character is pretty well formed, strong and close friendships are doubtless valuable. To have a friend that one is willing to fight for, and, if necessary, die for, puts new meaning into life and makes it worth living. Then, in summary, children should not have their association narrowed to any one child, but in later adolescence, when character begins to crystallise, much good may come from close associations, but even then the rest of the world must not be shut out.

Gangs and clubs.—Boys' clubs, their dangers and possibilities, assume a large importance at the present time. Riis, Forbush and Jane Addams have made us familiar with these problems. A census taken by the author of about 100 students in a certain class revealed the fact that most of them had been members of a club. These students were asked to give the effects, bad and good,that come from belonging to these clubs and gangs. The good points mentioned were: (1) social training; (2) literary training; (3) skill in sewing, painting, etc.; (4) gives an understanding of human nature; (5) gives high ideals; (6) good effects from being kept out-of-doors; (7) friendships formed; (8) sympathies broadened; (9) leadership and self-reliance taught by the club or gang. The bad effects mentioned were such as the following: (1) narrowing; (2) make

members snobbish; (3) make members clannish; (4) teach bad code of ethics; (5) teach law-breaking; (6) lead to quarreling and make enemies. Many of these, bad as well as good, were due to the special object or nature of the particular club.

The gang instinct is strong, and it is evident that if it could be allowed to manifest itself, with the evil influences lopped off, a great gain would thereby be effected for education. And a study of the bad influences leads to the conclusion that they may, in part at least, be avoided. At a certain age the formation of clubs and gangs seems to be a very natural thing for boys and girls to do, and this natural tendency ought to be taken advantage of if possible in the interest of education. It should be made to help in the education of youth, instead of allowed to be a hindrance. This, of course, may be said in regard to all natural tendencies,—they must be utilised in the scheme of education, if it is at all possible. When this is not possible, and we are sure that the education itself is not wrong, then the tendency should in most cases be killed, allowed to die for want of exercise.

The spirit of the club should be spontaneous, but older people can direct the purpose of the club and the gang instinct can be aligned with other instincts, particularly with the play, the collecting and the migratory instincts. Young people do not resent the interference of elders if the elders are in sympathy with youth. Every club can have its adviser and its whole influence can be directed toward good and the natural development of the members. But great tact and good judgment are needed on the part of those

who would advise or direct boys' clubs. Boys are active and need to lead a vigorous, athletic, out-of-door life. They do not care to belong to a club for the suppression of noise or for the establishment of a New England Sabbath, or even for the study of Shakespeare. Nor do they wish as advisers weak women or 'sissy' men. Boys are boys and must lead a boy's life; the more vigorous, the better for the boy. They are naturally suspicious of the kind old deacon who wishes to "do them good." He usually wishes to make old men out of them seventy years too early. The kind of club that they prefer is such that calls into activity the deepest, strongest forces of their nature,—fishing club, hunting club, camping club, athletic club, naturalist's club, all of which provide for great activity, and which usually take them out-of-doors and give opportunity for an active life. And he who would be an adviser of boys must be a boy himself. He may be seventy years old, but the spirit of youth must be in him.

Why gangs are formed.—In our large cities gangs are numerous, almost one to every block. The reason for this unusual manifestation of the gang spirit is pretty clear. The gang, in its present form, is one of the products of our modern society, the outgrowth of modern social development. Under more primitive conditions, the child's natural desire for social activity was well provided for in the ordinary work and play with brothers and sisters and also with neighbors. The modern city child has no work and not the right kind of play,—free, outdoor romping and running, chasing, and exploring wood and stream. That the modern school does not fully pro-

vide for the social instincts shows that it is not entirely the right kind of school. The school room has been a sort of jail, where children, although physically in proximity, were socially isolated. Mutual help and free intercourse among the children—the perfectly natural thing—have for the most part been forbidden. Although the development of the social instincts is one of the greatest possibilities of the school, this one thing it has largely failed to do, and, instead, has turned their training over to the streets. The possibilities of organising the school as a club to provide properly for the social needs of the children have hardly been dreamed of. A number of children forming a room or grade should be a unit for doing all the things that the children ought to do. Now it should be a nature study club for the finding out of all the wonders of the wide out-of-doors, now a debating club, now an athletic club, now a picnic club, and so on. In a word, the school should supply all the needs of the child, at least all those not supplied by the home. In the school the child should find full scope for all activities. The traditional school can not do this. Its scope and function and form of procedure must be greatly enlarged. It is a great mistake to make the school stationary. The world can not be brought into a school room, neither can child-development best go on there. The school should be a social unit, but should do its work wherever that work can best be done. If a part of the world can not be brought into the school room, then the child should be taken to it. As a nature study club, the school should explore the natural environment, and as a civic club it should study the civic and

social environment. This does not mean that the school should be called a club for this or that, but that it should perform these social functions. The education of the child should be controlled by the school and the home. The movements outside of school to organise children are dangerous. The whole training and education of the child should be unified and under the control of professional teachers scientifically trained for their work. If there is a part of child-nature that the school and home are not taking care of, then they must enlarge their sphere. And it is the contention here that the school organisation should provide for all the social needs of the children that are not taken care of by the home.

Another reason for the modern street gang is the disappearance of home-life. The child in the rural community that has plenty of work and play at home with brothers and sisters and parents has most of the needs of his nature satisfied. The city child, as already mentioned, has no work and no proper play. He can not work alongside of his parents, for they are away from home at the factory; therefore the child must go to the street and join the gang when he is not in an unsocial school room vigilantly watched by a teacher whom he too often considers a taskmaster and an enemy. We are aware that these conditions are not universal and are far from believing that they are necessary. The school can be so organised as to make other forms of organisation both unnecessary and impossible. To this end, parks and playgrounds can be much extended and the nature and function of the school much changed. And a thing very much to be desired is the revival of

home-life. The modern parent does not live with his children nearly as much as he should and can. The family fireside must be revived, although around the radiator. Parents must live much more with their children and enter much more into their activities. This will solve a large part of the difficulty and render the necessity of the gang not nearly so great. For the gang is not solely a manifestation of the gang instinct, but a means of providing for a number of activities and interests not properly provided for. If the home and school provide for these needs, the street gang will not be a necessity for the child. The worst influences of the gang are seen in the largest cities, where so many aspects of the child's life are neglected and where family life has suffered most decay.

High school fraternities.—Probably worse than the gang of the city street is the high school fraternity, opposing the best interests of the school and of democracy itself, and by imitating the social activities of adults, ripening the sexual instincts prematurely, and forming habits of dissipation, snobbishness, extravagance and idleness. But that within the school itself an organisation should be formed to provide for the socialistic instincts is the very best proof that the school is not fulfilling its function in this respect, although it must be recognised that many influences are at work to produce the school fraternity. The boy who must hurry home from school to use the bucksaw, shovel, ax or hoe, and who spends the evening around the family fireside reading and talking with parents and brothers and sisters, is receiving a much better training for citizen-

ship and manhood than the city boy who belongs to a fraternity and spends much of his time outside of the school and family. A boy's best club should be the family circle and his best chum should be his father; even the school should be secondary and supplementary.

Sympathy and co-operation.—If the modern school should make greater demands upon the instinctive tendencies connected with the emotion of sympathy, with co-operation and altruism, and somewhat less upon the individualistic instincts, it would strengthen these late and weak tendencies and be better for our modern society. There is no reason why the school should not be a training in social service and co-operation. The idea should be to bring out the best in each individual for the good of the whole, and each child should learn to do what he can do best. The children in school, therefore, should act much as do children in the home, mutually helping one another, and should early learn that the welfare of each is dependent upon the welfare of the whole, while the welfare of the group depends upon each one's doing his best. Children can not be prepared for social and civic duties without conscious and directed training. These facts do not mean that the formal aspect of a club is necessary, nor do they mean that a school is to be transformed into a mob, or into a George Junior or Senior Republic, or any other of the numerous fads proposed every day. The school must always be much of a monarchy, just as the home should also be, but a monarchy whose ruler is wise and benevolent and who rules only because the subjects are not wise enough to rule themselves, and

whose rule is the best sort of preparation for self-government.

QUESTIONS AND TOPICS FOR FURTHER STUDY.

1. Write up the history of your own experience with chums and point out the effects, good and bad.
2. Study the members of some family with the purpose of determining whether there is any difference in the degree of socialisation, comparing the older with the younger. In a similar way make a study of as many children as possible that are *only* children, and determine whether there is any uniformity in their variation from the average child that is reared in a larger family. A good procedure would be to determine the characteristics of 50 *only* children, then determine the characteristics of 50 children, chosen at random, that are members of larger families.
3. If the parents are careful and wise, and the *only* child has plenty of playmates, can it become as well socialised as the child of a larger family?
4. If the first part of one's life is largely spent in solitude, are the social instincts likely to be much developed? Do you know of such a case?
5. What part does imitation of elders play in the formation of clubs and gangs by young people?
6. Do you know anyone who is individualistic and solitary in his habits? If you know of such a case, can you explain it? Can you cite the case of a child whose selfish nature is being allowed to develop at the expense of the social nature?
7. In a family of several children, do you think that either child has any advantage as far as the development of the social instincts is concerned? Make careful observations with this point in mind.
8. Make a study of pupil self-government to see if it fosters the development of the social nature. Read a description of the methods used in the George Junior Republic. (See the references.)
9. Would it be well for children to have perfect liberty to help one another in the schoolroom?
10. Do twins make good chums for each other, or are they too much alike?
11. Are country children as likely to form gangs and clubs as are city children?
12. If plenty of social activity is provided, do we still have the club and gang?
13. How can parents prevent the necessity of clubs and gangs?
14. How should a teacher deal with a spoilt child—one that is selfish and has not been properly socialised?
15. In the process of socialisation, by measuring himself up with his fellows, a person may discover that he is inferior in some respects. Is this discovery a good thing for him?

16. Would many parks in a city help to lessen the evil effects of gangs?

17. In what way can education properly utilize the gang instinct?

18. Make a study of some cases of chumming and close friendships and try to determine the cause of the mutual attraction. What is the basis of your attraction to your best friends?

19. Show the necessity of co-operation and sympathy in modern social life.

20. Show that, from the point of view taken in the first chapter, a part of the function of the school is the proper socialisation of the pupils. Show how the school does this work; how it could do it better.

21. Show what a great character in a community is the man or woman who shows the most earnest and real co-operation and sympathy. Note that there are always characters that assume such a rôle, but do not possess the virtue.

22. Are chums likely to sink to the lowest that is in them, or rise to the best? What can you say about gangs in this respect?

23. Show that Dewey's scheme of education as outlined in *School and Society* takes proper account of social instincts. Have you any criticism of the scheme?

24. Enumerate all the changes in the schools necessary to make them take proper account of the socialistic instincts.

25. Try to discover the rules of boys' gangs. Does your study throw any light on the nature of boys and their proper training?

26. Indicate various attempts of the present time to organize young people. Show that all this work is properly the work of the school.

27. If you are, or ever have been, a member of a fraternity, enumerate its benefits and disadvantages. Is it possible to remove the disadvantages, or are they inherent in the nature of a fraternity? Is the same thing true of both the high school and university fraternities?

REFERENCES.

The gregarious instinct, clubs, gangs, etc., E. A. Kirkpatrick, *Fundamentals of Child Study*, p. 118; G. S. Hall, *Adolescence*, Vol. ii, Ch. xv; also in *Youth*, p. 207; also, *Some Social Aspects of Education*, in *Pedagogical Seminary*, Vol. ix, p. 81; H. D. Sheldon, *Am. Jour. Psych.*, Vol. ix, 425; W. B. Forbush, *Pedagogical Seminary*, Vol. vii, p. 307; also Vol. xvi, p. 337; also *The Boy Problem*, 1901, Chs. ii and iii; W. Buck, *Boys' Self-Governing Clubs*, 1903; J. A. Riis, *The Children of the Poor*, 1892, Ch. xiii; also on *The Genesis of the Gang, A Ten Years' War*, 1900, Ch. v, and *Battle with the Slum*, 1902, Ch. ix; Jane Addams, *The Spirit of Youth and the City Streets*, 1909; also *Democracy and Social Ethics*, 1907; M. V. O'Shea, *Social Development and Education*, 1909, Chs. xi and xiii; J. Dewey, *The School and Society*, 1900, gives some idea of what a socialized education would be like; on the George Junior Republic see *George Junior Republic, Nothing Without*

Labor, 1910; W. R. George, *The Junior Republic*, 1910; also J. E. Gunckel, *Boyville*, 1905, shows what adult direction can accomplish with the boys of the city; J. W. L. Jones, *Sociality and Sympathy, Psych. Rev. Mon. Sup.*, Vol. v, No. 1.

On Chums, see F. G. Bonser, *Ped. Sem.*, Vol. ix, 221.

On the Only Child in a Family, see Bohannon, *Ped. Sem.*, Vol. v, p. 475.

The parental and sexual instincts are not treated in this book, but the subject is of great importance to the teacher. The following references will be found helpful: P. Geddes and J. A. Thompson, *The Evolution of Sex*, 1890; C. R. Henderson, *Education with Reference to Sex*, 1909; M. B. Williams, *Sex Problems*, 1910; G. S. Hall, *Adolescence*, Vol. ii, Ch. xi; also *Educational Problems*, Vol. i, Ch. vii, and Vol. ii, Ch. ix.

Chapter VII.

THE ENVIRONMENTAL INSTINCTS.

The Migratory Instinct.

The migrations of lower animals.—The migrations of seals will well illustrate this instinct. At a certain season of the year the seals leave the Alaskan islands and go southward in the Pacific ocean for hundreds and even thousands of miles. They stay south during the fall and winter, and return in the spring to the northern islands to breed. The dates of their return to the breeding islands show remarkable regularity. Changes in the environment—the seasonal changes—and changes in the seal's body itself serve as the stimulii to start it off on its long journey. Back and forth it goes, year after year, with clock-like regularity. The past life and experience of the seal has left its body with such an inherited neuro-muscular structure, — with co-ordinations ready formed,—that the conditions of its existence send it forth on its annual circuit to the south to feed, and back again to the northern islands to breed. No less interesting is the case of the salmon. At a certain season of the year the Columbia river is literally alive with these fish. With head turned up-stream, irresistibly and with the blind determination of fatalism, they make their way to the gravel and sand of the head-waters of the Columbia to spawn. Not a

bite of food do they take, but steadily go on, leaping the falls and rapids, till they reach the shallow waters, their bodies being much the worse for wear. After reaching this destination, they deposit their eggs, and drift down stream, tail first, to die. The young hatch and slowly make their way down stream to the ocean, where they live for a few years, growing to considerable size, and finally seek the river's mouth and go up-stream to spawn and die, repeating the life-circuit. This is even more remarkable than is the migration of the seal, for it is conceivable that in the case of the seal the young could follow the old ones and learn the habit of migration. But with the salmon this is not possible, for the young are not accompanied down stream by the old fish. Each host of salmon is a new crop, and in its migration to and from the sea can be responding only to a blind impulse. Quite similar to the migrations of the seals is that of the birds. In the fall the birds come together, often in great flocks, and soon start south for the southern states, Mexico, and even Central and South America, where they spend the winter. As the northern spring comes on, the birds start north again and go to their old nesting places with considerable regularity, the time varying somewhat with the condition of the weather. Sometimes they return to the same tree, and even to the same nest, after journeying, in some cases, for many thousands of miles. What has brought about this wonderful phenomenon of migration in many animals? The answer to this question for any particular species of animal is to be found in the past history of the species and of its environment. All surviving animals are delicately

adjusted to the conditions of their surroundings. These conditions are seasonal and climatic changes and changes of the food supply. Experiments have confirmed the idea of the close relations that animals have to the conditions of their surroundings. To give one illustration: tadpoles confined in a vessel can be made to migrate by varying the temperature of the water. By heating the water at one place and keeping it cool elsewhere, the tadpoles are made to go to that place in the vessel of water whose temperature suits them best. Certain temperatures and definite conditions as regards the other factors of the environment are most favorable for the growth and life of every species.

Migrations in response to seasonal and climatic changes, and varying conditions of food-supply, have doubtless been as important a factor in the past life of man as with lower animals. It seems quite likely that man has passed through various stages of existence as regards food, such as fruit-eating, fishing and hunting. Granting that this is the case, then it would follow that migration has played an important rôle in his past life. Man has doubtless had a most delicate relation and adjustment to forest and stream, hill and valley, to changing seasons, to day and night, and perhaps even to the varying phases of the moon. If the generally accepted theory of man's origin and development is correct, we should naturally expect that his long apprenticeship to these rhythmical changes of nature would leave some remnant or trace in his organism. Moreover, nearly all history begins with vague legends and traditions of migrations. Back of the history of Greece and Italy and England

is *migration*. Great migrations of the American Indians are well established.

But we have much more than analogy and speculation on which to base a theory of a human migratory instinct. A careful study of childhood and youth, a study of such phenomena as truancies and runaways, and atavistic, roving tendencies in many adults, shows beyond question the traces of impulses to rove, old in racial history, still existing in man. Of course, man's condition for some time has been predominantly sessile. The lengthening period of infancy, necessitating family life, has made more and more for stability and permanency of abode, and weakened the wandering and migrating tendencies, causing man to move only when the environing pressure became extreme. Man has built him a home, and social influences and the necessities of rearing the children have kept him and wife and children there. But when social influences are weak and the conditions favoring roving or moving are strong, either parent may leave the home, and especially likely to go are the children. So, although the migratory impulse is subdued and controlled by social and parental influences, certain conditions unfavorable to home life may make it possible for the instinctive tendency to become operative, and sometimes active for life. In the Gypsies, the roving instinct is a prominent factor of life. Tramps and "hoboes" travel about all their life under control of the blind impulse to move. It seems, then, that in childhood and youth there appears a genuine, inherited tendency to migrate, to move about and see and explore other places, but that favorable home conditions overcome

this impulse ordinarily. And, on the other hand, unfavorable home and school conditions, and possibly other factors, may produce truancies and runaways that seem truly instinctive in nature, and in some cases a roving life thus begun is continued and the individual is never afterward content to remain long in one place. This roving disposition looks very much like a condition of atavism or reversion. Almost every community has its "gad-abouts," both women and men. There are men who stay with their families but a short time, then go away. Often they return after irregular intervals, with a determination to stay at home, but it is not for long, for off they go again.

Truancies and runaways. — Truancies and runaways take place most frequently in the spring and summer. This, *a priori,* is to be expected, if the theory of the migratory instinct set forth above is correct. The spring must always have been an important period of migration for primitive man after a more or less enforced life in one place during the winter. It is well known that the American Indian broke camp and set forth in the spring on warring and hunting expeditions. Most people of our own race, with the approach of spring, feel the impulse to move, to go anywhere to get out of the house. Then, too, don't we have our annual migration when we move every spring into another house? At any rate, whatever be the explanation, most truancies occur in the spring.

As soon as children are able to walk and get out of doors, they run away, blindly going on and on, neither knowing nor caring whither, but greatly en-

joying the going. It takes, however, only a little care to break this early tendency to explore the world and to fix fairly well the habit of staying close to the house. But, easy as it is, some parents allow the matter to trouble them for years, when perhaps the proper use of a little switch would, at the beginning, set the matter right. In later childhood and early youth the tendency to run away comes in different and much stronger form. In the years just preceding adolescence, and during the early years of adolescence, there are many cases of both truancy and runaway. If the tendency is not checked and subdued in early adolescence, there is much danger of permanent roving tendencies. There is, perhaps, considerable danger in allowing a person, even in later adolescence, to see too much of the world before home ties and domestic habits have become quite strong. We are told by students of this subject that during the years of eight to twelve the roving instinct is either subdued or becomes a life-long tendency, as a rule. The rover may become a life-time tramp; sometimes he drifts into a life of crime. The danger of this is very great, for the man who is here today and somewhere else tomorrow does not feel the same respect for social custom, for life and property, as does the permanent member of a community. Sometimes the rover marries and attempts to live a settled life, with the result already mentioned,—he periodically leaves home,—sometimes, however, he does not leave, but continues to move with his whole family several times a year.

Causes of Truancies.—From what has been said about the nature of truancy, it is evident that any-

thing which works against the social influence of the school and home may serve to call the migratory instinct into being. Among these are: (1) the desire to work and play out-of-doors; (2) the dislike of school; (3) dislike of the teacher; (4) impatience of restraint, *i. e.*, a desire for free activity; (5) a vague discontent with the school and home surroundings and a blind desire to see and try other places. One's life is new and the world is new, and one wishes to go forth and try the new life in the great new world. This cause doubtless operates in the spring after the children have been in school all the winter. The work has become monotonous and irksome, the body is somewhat weakened by continued study and not enough exercise, the school loses its charm and the world outside calls loudly. The desire to get out and run away is then strong and unreasonable, and certainly appears to have the nature of a blind instinct. Unless school and home conditions are pretty favorable, many boys now play truant or run away.

The dislike of the school and of the teacher deserves more extended treatment. The dislike of school may be due to inability to do the work of the school well. And this, in turn, may be due to sensory defects, to poor nutrition, some other bodily defect, to poor adaptation to the grade of work required. But it matters not what the cause may be, if the child is unable to do the work, he will not like the school very long. Another cause is dislike for the *kind* of work required. The work may make demands on activities that are not functioning at the time, that have not yet appeared, and may leave unappealed to, functions that are demanding activity. It is said that pupils seldom

run away from manual training schools. And as regards the teacher, whatever the nature of the work, there will not be very great love for school if the teacher himself is not attractive. School, and sometimes the home, present too much the aspect of a prison. The child runs away from the prisons in his desire for free activity.

Certain anthropological and sociological considerations throw much light on the cause of truancy. It is found that truants are not so tall, not so heavy, not so strong, not so well developed physically as the average person of the same age. Most truants are the oldest, youngest or the only child,—the child not so well socialised. Some 65% of truants have incomplete homes. Poor home influence and poor heredity both make for weak social forces which allow the more primitive instincts to come forth. When poor home influences coincide with bad school conditions, then truancies and runaways may be expected, while if only one of these conditions exists, truancies ought not to be so likely to occur.

The school and the migratory instinct.—There are two possibilities of taking account of the instinct by education: (1) The child's natural desire to see and explore and travel should be in part gratified by the school and home. The curriculum and the methods of teaching should both make considerable demand for out-door work, done both formally and informally. Most of the world is outside of the school room. Education endeavors to acquaint the child with the world. The railroad, the steam engine, the automobile, the factory and workshop, the rivers, hills and mountains, the birds and squirrels and bugs and

bees and flowers, the city hall and the court house and the governor's mansion,—are all outside of the school house, as are also the various and manifold activities of man. Not only should the study of these things take the child out-of-doors, but the material that is furnished by the out-of-door study should constitute much of the subject-matter that occupies the children while within the school room. To illustrate: The study of geography should involve making a complete exploration of the locality, charting its various geographical features, such as streams and hills, forests, etc. The processes of land-formation and of erosion should be studied first-hand. This work should make the children explorers and would go a long way toward satisfying the desire to get out of the school house and rove. The study of the fauna and flora of the locality would also furnish opportunity for much out-door work and would in every way be a splendid thing for the children, satisfying many needs of their natures. Within limits, then, education can and should satisfy the demands of whatever instinctive desire to rove and explore the children may have. (2) The school and the home should have their social aspects made of such a nature and strength that the children will have little desire for any more extended migrations than those provided for by the school and home. The school and home should be the center around which the child revolves, but should exert such a strong pull upon him that he will not leave his orbit, comet-like, perhaps never to return. In other words, if the school and home satisfy the normal needs of the child, there need not be much fear that it will run away from either.

The Collecting Instinct.

Its universality. — Statistical studies show that practically all children make collections at some time in early life. Doubtless imitation and suggestion can account for many of the facts, and still other of the facts might be referred to certain of the individualistic instincts. But such studies of the subject as have been made make it appear that the universality of the phenomena can not be adequately explained except on the ground of a specific instinct. Children from a very early age show a disposition to lay their hands on everything that attracts their attention and to take it home,—such things as pebbles, sticks, leaves, acorns, bright pieces of metal, colored paper, cloth and strings,—anything that attracts the attention. The objects are not taken with any end in view—at least are not at first—and often very little attention is paid to the objects afterward. It looks very much like the remnant of an instinct to appropriate everything loose that could possibly be of any service. The impulse is not only apparently universal, but is pretty strong. The fact that as many as five collections have been found to be made on an average by the children of a public school shows that much energy is expended in making these collections.

Development of the instinct.—Children make collections as early as the age of three. The impulse to collect increases in strength till the age of eleven, when it reaches a maximum, and from about the age of fourteen there is a decline. Up to the age of eight the impulse is crude and groping, undirected by any motive, but from the age of eight on, the impulse de-

velops into a genuine interest. In some cases it becomes a strong passion, superseding nearly all other interests. At first there seems to be little interest in the things themselves that are collected; the phenomena are those of a blind, groping instinct. Later, the objects collected assume to their possessor great value, whether they be worthless, cancelled stamps or Indian arrowheads. Each individual object is carefully preserved, and often the possessor would not sell his collection for any price.

Every conceivable kind of thing is collected; natural objects, however, rank highest. Of course, imitation has much to do with determining the kind of thing collected. The specialisation of the object that calls forth the response of collecting is in harmony with the general fact of the specialisation of stimulus that has already been mentioned. A particular kind of thing, or a particular range of things, calls forth the response to the exclusion of other kinds of objects. Many of the phenomena here doubtless fall within the realm of habit, but there seems to be a natural tendency back of the habits.

In the earlier stages of the instinct little arrangement is to be found in the collections, little classification. The collectors are naturalists rather than scientists. The objects are merely heaped together, often in a heterogeneous mass, sometimes not got together at all, merely left around about the house; but later much skill and interest are shown in arranging and classifying the objects.

Pedagogy of the collecting instinct.—Education could profit greatly by making large demands upon the collecting instinct. It seems clear that early

childhood is the time to send children forth to the fields and woods, to study what they find there and to gather specimens. The children can form naturalists' clubs for the purpose of studying the natural environment. Such study should embrace rocks, soils, plants with their leaves, flowers, fruits and specimens of the wood of the various trees. Birds and insects can be studied and collections made of each species. The work of such a club would have a twofold value. (1) The study and collecting acquaint the child with his natural environment, and in doing it afford a sphere for the activity of many aspects of his nature. They take him out-of-doors and give an opportunity for exploring every nook and corner of the natural environment. The collecting can often be done in such a way as to appeal to the group instincts. For instance, the club could hold meetings for exhibiting and studying the specimens, and sometimes the actual collecting might be done by children in groups. (2) The specimens collected should be put into the school museum, and the aim of this museum should be to represent completely the local environment, the natural and physical environment, and also the industrial, civil and social environment. The museum should be completely illustrative of the child's natural, physical and social environment. The museum, therefore, would be educative in its making, and when it is made it would have immense value to the community, not only to the children, but to the whole people. In this museum, of course, should be found the minerals, rocks, soils, insects—particularly those economically important — birds, especially those of any economic importance, and

also specimens of all the wild animals of the locality. If proper appeal is made to the natural desire of the children to make collections, this instinct would soon be made of service in producing a very valuable collection. The school museum in which they are placed should also include other classes of specimens. There should be specimens showing industrial evolution, the stages of manufacture of the raw material of the locality, specimens of local historical interest, pictures, documents, books. The room in which these specimens are housed should be at least as large as the regular school room. The museum and a smaller room for a work shop should be most important parts of the school building. In rural communities, perhaps in all communities, the school building should be the center of interest and activity for all the people of the community. When we add to the museum a library, not only for the children, but for the old people as well, we have a pretty good idea of what ought to be in a school house. The school should stand for the interests of the community and should represent them. It could be made of such a nature that the parents would go there nearly as often as do the children. The school should be for the instruction of all the people of the community. It should be the experiment station, the library, the debating club, the art gallery, for the whole community, and should crystallise the life of the community and unify it. Of course, the man who runs the school should know and represent the community life; he should be a man capable of giving advice to the people of the community concerning the things that they

must do and the life that they must live. In the farming communities he should know more about farming than any one else in the community. This ideal school is not all to grow out of the collecting instinct, but this instinct and the museum that is to come from it would be important factors in making such a school.

QUESTIONS AND TOPICS FOR FURTHER STUDY.

The Migratory Instinct.

1. Make a complete study of a case of chronic truancy, considering it from every point of view. Discover the boy's natural desires and inclinations; inquire carefully into home conditions and hereditary influences. Are both parents living? Do they live together? What is the boy's position in the family, *i. e.*, is he an only child, youngest child, oldest child? How large is the family? What are the school conditions? How does the boy get on with his studies, with the other pupils, with his teacher?

2. Can you find a case of truancy in which the home and school conditions are good and the child does well with his studies? If you can find such a case, is there an explanation for it in the excessive migratory impulses of the child?

3. Did you ever 'play' truant or run away from home yourself? If so, what were the causes and consequences?

4. Make a study of as many cases of truancy as possible to determine whether the truants have any natural traits in common. For example, do they love the woods and streams? Do they like to hunt or fish? Are they more interested in objects of nature than the average child? Do they know more about what is doing in the world, more about machinery, etc., than the average child?

5. When you have the opportunity, make a study of the anthropological aspects of truants, comparing their height, weight, vital capacity, etc., with those of normal children.

6. Similarly make a psychological study of truants, comparing their various mental functions with those of normal children, taking such functions as memory, attention, learning capacity.

7. How should a teacher deal with truancy? How should parents deal with it? Are temporary measures, such as punishment, of any use? Rather, should teachers and parents try to discover the fundamental causes and remove the causes if possible? Can you cite a case in which it was apparently impossible to remove the causes?

8. Is it strange that some children should find it hard to reconcile themselves to the schoolroom, when we consider how different the confinement, repression, restrictions and work of the schoolroom are from the primitive conditions of child life?

9. Read the first chapter in Swift's *Mind in the Making* to see if it throws any light on the causes of truancy. The essential point to consider is that many of the great men of modern times found the work of the school poorly fitted to their needs and desires.

10. To what extent are the schools themselves responsible for truancy?

11. Suggest changes in the curriculum and methods of the school that would reduce the number of cases of truancy.

12. How can the school utilize the migratory impulses of the children?

13. Why do girls seldom 'play' truant? Did you ever know of a girl running away from school or from home? If you know of a case, describe the circumstances.

14. Is there any connection between truancies and the modern street gang?

15. If it is ever possible for you to do so, collect the data for truancies in a large city and find their distribution for the months and seasons.

16. Are there more cases of truancy in the city in proportion to population than in the country?

17. In a case of truancy resulting from a poorly-nourished body, what is the teacher to do?

18. Can you find any evidence of truancy 'running in a family'? If so, are there any other characteristic traits in the family?

19. Do you know of a man or woman who seems to have retained the migratory impulse? If so, write an account of the case.

20. Collect data to show where truants go when they run away from school.

21. If a large amount of time is taken to study the social and natural world out of doors, will there be time enough left for practice and drill in arithmetic, writing, spelling, language, literature, etc., in the schoolroom?

22. Which is the more important factor in the production of the American 'hobo' or tramp, the migratory instinct or our social conditions?

23. Suppose a boy should run away from home. How should the matter be treated by the parents? What do you think of the plan of paying no attention to the runaway for a time in the hope that he might have such a bitter experience that he would not care to repeat it?

The Collecting Instinct.

1. If you ever made a collection, write an account of it. What did you collect? What was the motive? What did you do with the things collected? How many collections have you made? How old were you when you made them?

2. Outline a plan of school work for the utilisation of the collecting instinct.

3. Make a list of the things that children in the rural schools can collect; make another list of the things that could be collected by city children.

4. Point out the different ways in which education could profit from excursions to make collections and from the material collected. Show that the gang instinct, the migratory and the collecting instincts would be called into play; show also that the material and experience would be available in many subjects.

5. Outline a plan for a school museum in a rural community. Include in your plan the material for the museum and its arrangement.

6. Will a competent teacher, who has a little tact and common sense, have any trouble in convincing his patrons of the value of the kind of work suggested in the chapter? Of course, it is necessary to begin in a small way and let the value of the work become evident before requests are made for equipment. And equipment, after all, is not of very great importance. The greatest part of the required equipment is knowledge and enthusiasm on the part of the teacher.

7. Point out the value to a community of having in the school building a complete collection of the insects of economic importance in the locality, and the value of having in the library scientific literature on the life histories of these insects. Show that this is in harmony with the idea of education given in the first chapter.

8. Do you think a complete collection of the birds of the locality would be of value? Or, rather, should the knowledge of birds come from field study?

9. Do you think it would be a proper work of the school to organize exploring parties and expeditions for the purpose of getting geological, geographical, botanical and zoological knowledge and specimens?

10. Would it be a loss of time for high-school boys to spend a week at such work, camping out in primitive fashion? Is it not possible that we have too narrow a view of the nature and function of the school?

REFERENCES.

The Migratory Instinct.

E. A. Kirkpatrick, *Fundamentals of Child Study*, p. 213; L. W. Kline, in *Pedagogical Seminary*, Vol. v, p. 381; *American Journal of Psychology*, Vol. x, p. 60; W. K. Brooks, in *Popular*

Science Monthly, Vol. lii, p. 784; G. Stanley Hall, *Adolescence*, 1904, Vol. ii, p. 375; Vol. i, p. 348; M. V. O'Shea, *Social Development and Education*, 1909, p. 151, a mere statement that the majority of pupils in school would be truants if they dared to be; *Psychological Clinic*, Vol. i, p. 21, for a description of a typical case of truancy; L. P. Ayres, in *Psychological Clinic*, Vol. iii, p. 1, on the relation of irregular attendance to poor work and elimination from school.

The Collecting Instinct.

Kirkpatrick, *Fundamentals of Child Study*, p. 205; G. Stanley Hall, *Adolescence*, Vol. ii, p. 484; C. F. Burk, in *Pedagogical Seminary*, Vol. vii, p. 179; E. Barnes, *Studies in Education*, 1896-1902, Vol. i, p. 144.

Chapter VIII.

THE ADAPTIVE INSTINCTS—PLAY.

1. Physiological considerations. — (1) *Relation of muscle activity to brain activity.* One-third to one-half of the brain surface has motor functions, together with other functions. Of course, in a sense, every part of the brain has motor functions, for every part is an interpolation between stimulus and response. But just as there are large areas more directly concerned with sensation, so there are large areas more directly concerned with the initiation of muscular contraction. It is significant that so large a part of the brain is concerned with motion. (2) *Muscular exercise and brain activity.* Of the motor areas above mentioned, certain parts are directly concerned with the movement of definite groups of muscles, and for these brain centers to develop, the exercise of these groups of muscles is necessary. If, for any reason, a group of muscles can not perform its proper function of contraction, the corresponding centers will not have their proper development. The necessity of co-ordinating muscular movement, without doubt, gave rise to the origin and development of these centers, in the first place, in species development. So, in the individual, the proper development of the motor centers is dependent upon muscular development. The biological experience of our species

has fixed in the organism certain necessities of individual development which cannot be ignored. (3) *Loss of body parts.* A person losing a limb in early life will lack development in that part of the brain controlling that limb. This, of course, is but a special case of the fact just discussed, and both may have their truth more generally expressed in (4) *Brain development and exercise.* Not only does each group of muscles have its corresponding brain center dependent upon it, but the development of the brain as a whole is dependent upon the richness and fullness of muscular activity. The biological function of the brain is the *co-ordination of muscular activities with one another and with sensory stimulation.* (5) *Muscular adjustment.* Muscular co-ordination and adjustment are more important for brain development than is mere muscular strength. The greater the variability and complexity of muscular movement, the greater the demands upon the co-ordinating centers, and, therefore, the greater their development. It therefore follows that the kind of work and of play that is best for development is not that which calls for mere monotonous repetition of acts, but that which calls for change and demands the meeting of new situations. We shall learn later that mere, lifeless repetition has no place anywhere in education, not even in drill for the fixing of mechanical operations. (6) *Later psychic life related to early muscular activity.* The extent and range of later psychic life are dependent, in large measure, upon the extent and complexity of the neuro-muscular activity of early life; *i. e.,* varied and extensive muscular activity in early life means, other things

being equal, rich psychic life later. The bright child is active, always doing, always contriving; the dull child is slow, uncertain and without initiative. Muscular activity and mentality are clearly bound up together and are mutually dependent. It need not be said that muscular activity is a cause of mentality, but it certainly is a necessary condition of mental development. That an individual may reach normal maturity it certainly is necessary for that individual to pass through a childhood and a youth of almost infinitely varied and increasing activity. So close is this interdependence that the early mental development of a child is much affected by the amount of attention given it, the amount of handling in infancy and the opportunity afforded it for play and exercise. (7) *The will, the feelings and the muscles.* According to James, even feeling and will are intimately related to muscle activity and development. A large part of feeling, if not all of it, is due to the muscular response of the body accompanying sensation and ideation. Many of the finer feelings seem dependent upon the facial and other muscles of expression. The crude and unskilled laborer who habitually uses but the larger muscles, and is incapable of fine muscular co-ordination, seems also incapable of experiencing the finer shades of emotion. And there is probably much truth in the popular notion of the relation of weak will to flabby muscles. The man who is always doing is the man who *can* do, and the man who never does anything is the man who *can not* do. Although what we call strong and weak wills are largely matters of habit, there is probably some basis for them in the muscular system. A life of continued activity

makes further activity possible and easy, and a life of inactivity tends to make activity impossible.

These physiological facts make it certain that muscular activity and nervous organisation and development are closely related, and since mental development is dependent upon nervous development, it is therefore related to muscular activity.

Definitions and theories. — (1) Psychologically, play can not be distinguished from other forms of pleasurable action. It is always pleasurable, but work may also be pleasurable. Play is an activity performed for its own sake or the pleasure accompanying it, and for no other end, while work may be defined as an activity performed not for the sake of the act itself, but for the sake of some other end that is to grow out of the act. One plays ball for the fun there is in it, while one plows and tills the soil, not for the fun there is in the work, but for the sake of the grain that is to grow for his food. If one plays ball merely because there is felt the need of exercise, then playing ball is work, while, on the other hand, the tilling of the soil may take on the aspect of play if the work is done for its own sake and not for the fruits of the labor. From this common-sense point of view, then, we may say that when an action is performed for some other end than itself, it may be called *work;* when for its own sake, *play.* But this distinction of purpose between work and play is not a psychological one. Psychologically, all we can say is that play is one of the highly pleasurable forms of action. We may also say, however, that a large part of the play of children seems to be instinctive; this

fact throws it into the class of instinctive or inherited forms of action.

(2) It is from the standpoint of biology and genetic psychology that play must be considered if we are to understand its true nature as an instinct. From this point of view, we find play to be an expression of the ripening instincts of animals, and instead of being itself a special kind of instinct, it is an aspect of nearly all the instincts that appear in the animal's development. It has been called the *ontogenetic rehearsal of the phylogenetic series.* Whether play looks backward or forward is a disputed point. Hall, Johnson and others think the chief characteristic of play activity is its harking back to the past of the species' history. This activity may have no meaning in the present or future life of the child, but has its only rational interpretation in the fact of recapitulation. As a child passes to maturity, successive neuromuscular co-ordinations are formed and demand for their growth and development, activity such as was common in the past, the remote past, of the species. Groos, who has studied and written extensively in this field, believes that play looks forward; that natural selection has led to the survival of those animals that play in their infancy the things that they are to do as adults. This early activity gives exercise and practice to the animal in doing the things that it must as an adult do in order to survive, and as an adult it performs its life activities better because of this early practice. It is very doubtful, if the phenomena of imitation and suggestion be left out of account, that much that we call play has this interpretation. It is indeed rather doubtful that a truly instinctive

action is in need of practice for its perfect performance. The fact seems to be that at least many of the play activities of children have their only rational explanation in the past life of the species, and they have their great significance for the present *not* in that they are direct preparation for adult activity, but in that they are necessities of individual development. We reach adulthood only after some twenty years of growth and development. Each step of this growth is conditioned very definitely by preceding steps and stages. The nature of each step has been fixed by our biological past. In other words, developing structures demand, within certain limits, definite activities, which, in turn, condition later development, and therefore later activities. He who would read aright the long period of infancy must read it in the light of the past. In this way only can we understand the conditions and possibilities of its future.

Another theory of play that goes under the names of Schiller and of Spencer is known as the *excess energy theory*. This theory considers play to be an expression of the excess energy of the individual. It is probably true that this is a prominent factor of much play in children and especially of adults. But the theory does not express the whole truth for children when there is no excess energy. And much adult play has its explanation in certain instincts, particularly rivalry and competition. The fact is that there are several forms of activity commonly called play. But while this is true, there is certainly a large class of play activity of children that has its only rational explanation and interpretation in some such theory as that held by Hall and Johnson. At

the same time it may be true that some of these play activities have their proper explanation in one or the other of the other theories, especially that of Schiller and Spencer. But the play of children considered as the expression of the ripening instincts, and the play of adults considered as the expression of certain strong instincts, such as competition, does justice to most of the facts. That pleasure is always present in play is doubtless due to the fact that play is the free expression of natural functions, and this seems to be true of all instinctive actions.

(3) The view* that we have emphasized gives to play a great significance, because it is only by play of the right kind and in the right order that normal individual development can come. Previous considerations have shown us that activity is necessary for mental development. Our consideration of play shows that certain forms of activity, within limits, are necessary. Moreover, in infancy, work can not give sufficient activity; besides it would be difficult to find for a child the right kind of work and nearly impossible to provide sufficient variety for the best de-

*For a view of the nature of play, somewhat similar to the one emphasized in this chapter, see L. E. Appleton, *A Comparative Study of the Play Activities of Adult Savages and Civilized Children*, 1910. Dr. Appleton thinks that the demands of developing structures for activity is a sufficient explanation of play. "The structure of the body places limitation upon the kind of reaction which it is possible to make. The child, being built upon the same general plan as his ancestors, must of necessity use the same muscles and organs and in about the same way, and in so doing both recapitulates the phylogenetic inheritance and anticipates his ontogenetic future in those plays which have been called instinctive, and which are especially typical of infancy and early childhood." This theory, to some extent, takes into account the three principles involved in the three theories stated above, and doubtless accounts pretty well for all the facts.

velopment, but play provides for this activity in abundance. The recapitulation theory emphasises the necessity of certain forms of play in different periods of growth—a definite order of plays in order for the individual to reach the highest development. It is needless to say that the actual performances of the child need not be the identical form of activity of our ancestors, but must make demands upon the same aspects of mind and body. But quite apart from all theories of the meaning of play, there can be no question of its great significance for individual development, nor can there be any question that there is a proper sequence of plays best adapted to development. Indeed, it is the empirical facts that support the recapitulation theory, which is merely an attempt to put meaning into the facts.

Development of the play instinct. — In order to understand the development of the play activities we have only to consider the development of the child. For our purposes the life of the child may be divided into three periods: (1) infancy, (2) childhood and (3) youth, and each of these periods may be further divided into an earlier and later period. Infancy is the first five or six years of life, and is the time during which the child comes into possession of its powers. At birth it is helpless, undeveloped and exercises but few of its future functions. Everything must be done for it or it dies. In the first half-dozen years of life it acquires the power of locomotion and of speech; its senses develop and its brain rapidly grows to nearly its full size. By the end of this period it has learned a world and acquired a fairly definite system of responses to this world. This is

the great period of physical growth and adjustment, and everything looking to the child's welfare should merely provide for healthy growth. Most of the individualistic instincts come into function, and habits are formed to meet the varied situations of early life. This is pre-eminently an animal period of life. Reason is very crude even in the later years of the period—a matter of association merely. The period is most accurately characterised as one of intense activity. The senses are taking in a virgin world, and the muscles are trying this world on every side. Life now *is all play*. Each awakening impulse must have expression, every organ of sense must function. The world must be tried, the body must be tested. The legs must kick, the hands must pull and pound and scratch, the mouth must bite. The animal child becomes a human being. This life and this play are simple, and the toys and playthings of the child now should be simple—mere sticks to pound with, bright objects, balls, blocks, sand piles and boxes. The toy is the child's means of interpreting and testing the world. With it, he learns the properties of matter and forces and provides stimuli for his sense organs. The very first play is largely a matter of experimenting with the sense organs and other bodily organs; the child learns to use himself, learns the extent of his powers. And in the later years of the period the same activity continues and becomes more vigorous and extensive. The activities are extended to the fields and woods and take in a much larger surrounding; the child runs, climbs, jumps, and examines and explores every corner of his environment, becomes acquainted in the plant and animal world, and makes

collections. But all this play is informal, and the child cares little for formal, organised games such as the kindergarten provides. Play is essentially individualistic, and the child cares only to discover the world and to appropriate it to his own use. In these early years play is the natural teacher through which the child learns the world, on the one hand, and comes into his powers and capacities, on the other. There could be no development without it; it is the child's life and it brings the child to maturity. Infancy and childhood without play are inconceivable.

The second period, covering about six years, is one of fair stability, save for its beginning and end, which are transition periods,—transition from infancy to childhood and from childhood to youth,—but there are a few years of fair stability, of a fair adjustment to the world. At its beginning the first set of teeth goes and the new set comes in, the brain attains its full growth about eight, then for some four years the child is a fairly complete and perfect individual and meets his environment in a fairly settled way, till a new birth and a new life come with the dawn of adolescence. In this period play should provide much and violent exercise, and must satisfy a great variety of interests. The chief games are games of chase that make demands upon the large muscles and limbs. The child now naturally lives the life of a savage, and is a fisherman, hunter, trapper and warrior, and the plays and games of the period are such as call forth these primitive activities. Among the games mentioned by Johnson for this period are: hide and seek, puss in the corner, hawk and chicken, tag, dare base, black man, huntsman,

baseball, archery, jump rope, blind man's buff, bean bag, guessing games, dancing and nature plays and interests. In the later years of the period, swimming, skating, dramatic and imitative plays, throwing, shooting, shinney, football and wrestling in addition to most of those just named for the earlier years.

Third Stage. Adolescence.—With the coming of adolescence, our boy and girl pass to adulthood. The social instincts now become prominent. Each individual now tests his powers and finds his place; therefore games of competition are numerous, but at the same time group games that demand co-operation also grow in number and interest. Many of the games and interests of the preceding years are continued in this period, with increasing prominence of the vigorous ones and the out-of-door and nature interests. In this period, as in the preceding, play gives expression to construction, imitation, inquisitiveness, curiosity, the gang instinct, and so on. The play spirit appears in nature work, gardening, collecting, getting acquainted with wood and stream, *i. e.,* in exploration, adventure, hunting and fishing. All these activities are essentially play and provide for many aspects of human nature,—the migrating, collecting, fighting instincts and perhaps others being allowed to function. Dancing should be a form of play in all the periods, and for this purpose the folk dances and rhythmic group games should be revived, and dancing should be one of the free plays of the child rather than a debauched and degenerated social performance of adults.

Play and moral character.—Play, especially in the later group games, is a great moral force. Through

these games the child learns to co-operate, he finds himself by learning where he is weak and where strong. Sympathy develops and all the social factors. The games of youth are therefore a great socialising force. In them the boy learns 'team work'; he learns to subordinate himself to the group. The games of youth are an excellent preparation for citizenship in a democracy. They should, and under proper conditions do, develop bravery, courage, endurance, steadiness and faithfulness.

The pedagogy of play.—The child will play to the point of exhaustion; endure hardship and pain without murmur. We have said that most play of children is the expression of awakening instincts, and that the instincts are the only aspects of child life to which the teacher can appeal. It must therefore follow that play has most intimate relations to education. To illustrate: Much of the early work of educating children consists in drill, in fixing certain responses that we think desirable. Now, if these responses can be made part of a game, can become *play,* a very desirable end is then easily attained, and we shall see later how necessary it is to make a proper appeal to instincts, for unless drill is interesting and on a high level of attention it has little value. To become interesting it must appeal strongly to some instinct,—in a word, must become play. In drill work, then, in automatising the formal processes, is a large and important field where play can be of great service to education. In this sphere play is a mould in which the school activities can be fitted; is an avenue, for the expression of child life, through which development comes. The wise teacher is he

who can find in the child's nature a motive for its work, and when this is found the child will do anything; without it, nothing worth while. No activity that is not the expression of some part of child-nature can be a part of education. And those activities that are most potent in education are either play or approach play in spirit. It is sometimes said that such an educational doctrine as this is dangerous, that it means the making of "mollycoddles." But this can not be true. It is only a misapplication of the doctrine that does this. Of course, a child must learn that life is serious, that there are duties to be performed, that there is hard work to be done by every one who amounts to anything in this world, and part of a child's training should be a preparation for attacking difficult tasks and sticking to them till they are finished. But a child will get this training best when he is moved by some strong inward motive rather than by outward compulsion. Children may be driven by fear to do unpleasant things, but if this is against their will it gives little training in doing unpleasant things of their own will. The greatest work is always done by him whose heart is in his work. The greatest achievements will always be those that come from the love of work, and when work itself is loved it is no longer work, but play. The best work will always be done when the pressure is from within, when the organism is nearest to its true, natural functioning, and this is the sort of activity that we call play. It must not be thought, however, that the school room is to be turned over to the whims of the children. On the contrary, it should always have as its guide and head a person

of vigor and maturity. This person can, however, bring the children to the highest attainments and development if he make proper demands on native instincts and interests.

Play of adults.—The play of adults is not essentially different from that of children. It is in the adult, as in the child, the expression of old and fundamental impulses. The play activity of adults is a sort of mimic world that echoes the life activities of bygone ages; it is a faint revival of man's older self, and therefore the truest expression of his real self stripped of the latter day accretion. This activity has for him an intrinsic pleasure not dependent upon any other results. Some form of competition, or other old individual instinct, is usually involved. Modern man has gone mad. He thinks he can spend his life in a vain pursuit of illusory wealth and suppress the functioning of his older, and therefore most real, self. He forgets his wife, he forgets his children, he forgets to play. He grows old before his time; he is dead long before he ceases to walk around before his fellows. We must never give up playing. If we continue to play and to associate with children and youth, it will keep us young and keep joy in our hearts. We must revive the social customs of ancient Greece. It is no accident that the Greeks, the greatest of all men, played most of all men. The annual festivals and the Olympiads, bringing all Greece together in mental and physical play, had much to do with her glory. Even our universities are forgetting their function, for they do not teach their students to play. A football 'eleven' and a baseball 'nine' about exhaust their capacity, although there are thousands

of students in attendance. Long walks and excursions and games should be part of the daily life of every student. But instead of this, the author finds some of his students so degenerate physically that a few extra tasks send them to the hospital.

QUESTIONS AND TOPICS FOR FURTHER STUDY.

1. Make out a complete list of the games and plays that you engaged in as a child and youth. Indicate those that you liked most, and point out the aspect of the game or play that seemed to be the source of pleasure. Do you find a development or succession in the plays? Were there plays that you liked very much at one time, and later did not care for? Interpret what you find.

2. What theory or theories best account for the facts of your own play experience? Do you find some facts supporting each of the theories?

3. Give the experience that you have had as a teacher in controlling play on the school grounds; if not a teacher, give your experience as a pupil.

4. Give data showing the good effects of the proper kind of adult control of the play of children; give illustrations showing the bad effects of the wrong sort of control.

5. What is your experience with high-school athletics? What is there good and what bad in them as now conducted? Should high schools have teams of various kinds and play neighboring teams? What are the facts that bear upon this question?

6. Can you cite a case showing that muscle development is not necessary for brain development? Be sure of your facts, and be careful in taking the statements of biographers concerning the early life of eminent men. As a rule, little is known of the early life of great men.

7. How does the farm compare with the city in supplying facilities for activity? Compare the conditions and the results of the two types of environment.

8. Can artificial and mechanical indoor activities completely take the place of outdoor play? What seems to be the difference?

9. Carefully collect statistics of school children for the purpose of determining differences in regard to play activities. For example, make a study of 50 children that do not care to play and that do not take much exercise, and compare them with 50 other children that like play and that take abundant exercise. What conclusions come from your study?

10. Compare the very poorest pupils in a schoolroom with the very best in regard to their play and work activities.

11. Is play activity necessary for development, or will work

activity do just as well? Discuss every aspect of the question. Take especial account of the feeling aspect of work and play.

12. Is it natural for older people to care less for play than do children? Do you think it advisable for adults in America to play more than they now do? Why?

13. What do you think of football and baseball as forms of activity for high-school boys?

14. Do you think it advisable for boys and girls to play together throughout childhood and youth? What are the facts to be considered here?

15. Compare girls that like outdoor play and vigorous exercise, including play with boys, with girls that do not play with boys and do not care much for vigorous play—the girls that do their hair up on the top of their heads and consider themselves women.

16. Rank the pupils of a school room from the best to the poorest in school studies. What do you find in regard to the play of the two halves of the group?

17. Spend a day watching children play, comparing the play of children of different ages. What differences do you find as to what they play and the manner of playing?

18. Is there any danger that children that play a great deal will come to like play only and dislike work?

19. Is a teacher to try to make play out of everything? Should a teacher make a sharp distinction between play and work? Why?

20. If a child is deprived of the proper amount and variety of play as a child, is it possible to make up for this later in life?

21. Show that what is play for one may be work for another, considering singing, playing musical instruments, mathematics, etc.

22. In what phase of school work is play most applicable? Show how it may be used in various studies.

23. Should teachers act as police on the playground, or should they take part in the plays and enter into the spirit of the pupils? Why?

24. How should a teacher deal with a child that does not care for play, but wishes to sit around and read all the time?

25. Sometimes young children enjoy work better than older children. Why is this?

26. Which has played the greater part in the achievements of man, the play spirit and mere curiosity, or necessity? Collect facts for the answer of this question.

REFERENCES.

Kirkpatrick, *Fundamentals of Child Study*, p. 147; G. Stanley Hall, *Adolescence*, Ch. iii; *Youth*, Ch. vi; H. H. Donaldson, *The Growth of the Brain*, Ch. xviii; J. M. Taylor, *Motor Education for the Child*, in *Popular Science Monthly*, Vol. lxxviii, p. 268; A. F. Chamberlain, *The Child*, 1901, Ch. ii, an excellent chapter; L. H. Gulick, *The Psychological, Pedagogical and Religious Aspects of Group Games*, in *Pedagogical Seminary*, Vol. vi, p. 135; *Some Psy-*

chical Aspects of Muscular Exercise, in *Popular Science Monthly*, Vol. liii, p. 793; *The Healthful Art of Dancing*, 1910; *The Efficient Life*, 1907; G. E. Johnson, *Education by Plays and Games*, 1907; K. Groos, *The Play of Animals*, 1898; *The Play of Man*, 1901; W. P. Bowen, *The Mechanics of Bodily Exercise*, 1909; N. B. Lamkin, *Play: Its Value and Fifty Games*, 1907; E. B. Mero, *American Playgrounds*, 1908; A. Leland, *Playground Technique and Playcraft*, 1909; L. E. Appleton, *A Comparative Study of the Play Activities of Adult Savages and Civilized Children*, 1910; J. W. Dinsmore, *Teaching a District School, with a Supplement on Playtime*, 1910; M. B. Newton, *Graded Games and Rhythmic Exercises*, 1909; G. Sisson, *Children's Play*, in Barnes' *Studies in Education*, Vol. i, p. 171; H. D. Sheldon, *Institutional Activities of American Children*, in *American Journal of Psych.*, Vol. ix, p. 425; J. H. Chase, *Street Games of New York City*, in *Pedagogical Seminary*, Vol. xii, p. 503; G. Dudley and F. A. Kellor, *Athletic Games for Women*, 1909; L. Beard and A. B. Beard, *Recreations for Girls*, 1908; C. W. Crampton, *The Folk Dance Book*, 1909; C. Crawford, *Folk Dances and Games*, 1908; B. R. Parsons, *Plays and Games*, 1909.

Chapter IX.

THE ADAPTIVE INSTINCTS—IMITATION.

Description and definition.—The phenomenon of imitation is but a special manifestation of a fundamental principle of organic matter, *i. e.,* the principle of stimulus going over into response; in the higher animals, perception going over into action. Stimulus has no meaning apart from response; sensation has no meaning apart from action. The only reason that one should have sensation is that one may be able to respond to the environment. In the case of imitative movements, the response is more or less like the stimulus, more or less like the source of sensation calling it forth. Natural selection has developed this form of action, just as it has developed all other inherited forms. There is no reason in nature why any sort of response should not be coupled with any sort of stimulus. That a large number of the responses of children reproduce the stimuli of the environment, *i. e.,* are imitative, is a matter of heredity, and therefore this particular form of activity is considered to be instinctive. Owing to the peculiar circular nature of imitative action, Baldwin defines it as *that reaction that tends to maintain or repeat its own stimulating process.* This is especially evident in the imitation of sounds. The young child will repeat the same sound over and over again for many minutes at a time, each sound being

the stimulus for the production of the next one. But it makes no difference what the sensory source of the perception may be—although it is usually sight or sound—the perception of the movement calls forth the same sort of movement; there is a resemblance between stimulus and response, and therefore in many cases the response may serve as a new stimulus to call forth a similar response. The continuation of the circular process is not, however, necessary to this form of action, nor does it always take place. The essential characteristic that differentiates this form of inherited response is just this resemblance between the animal's response and the objective means of calling it forth. A chicken hears a hawk and darts under cover. This is a matter of heredity, of the individualistic instinct of fear. A child sees an older person put on a hat; it then takes a hat and puts it on its own head. This is also a matter of heredity; we say it is due to the instinct of imitation.

Psychological explanation.—The phenomenon of imitation is easily understood when we recall the fact that the idea of a movement tends to call forth the movement, and will usually do so unless there is some inhibiting idea or sensory stimulus. In the early years of life the connection between idea and response is unusually close and direct; the lesson of inactivity is not yet learned. The perception of movement functions immediately to call forth a similar movement, or a movement that serves to produce the same effect for sensation.

Imitation in lower animals.—Among the lower animals, particularly below the primates, there is little imitation. Their acts are the inherited responses

that fit all the particular phases of the environment, or the result of the modification of these responses by experience. Their responses are definite and immediate. It has not been necessary for these animals to imitate in order to get on in the world. The very character of their mentality is to some extent a bar to the calling forth of similar responses by the perception of a movement. They do not seem to have free ideas which are essential to many forms of imitation. The perception of a movement made by another being has not, in many cases, developed into the character of a stimulus for the same kind of movement or movement producing the same sensory effect. Moreover, even if psychologically possible, imitation is not physically so, for not many animals live with their parents long enough to learn much from them by imitation, and therefore their responses must be ready made and definite. Finally, experiments prove that the animals below man do not learn much by imitation; possibly only the very highest can learn at all in this way. As Spalding points out, chickens may live continually with turkeys, but do not learn the more efficient turkey method of catching flies. In certain animals of a social nature natural selection has developed a sort of reflex imitation. The fact is that imitation is preeminently a phenomenon of infancy and infancy is essentially a human characteristic. Only the young of the human race have a long period of helplessness, during which the primitive instincts are moulded and modified into permanent life-adjustments. Only a long period of plastic infancy could make it possible for imitation to play an important rôle in develop-

ment. Therefore, infancy and imitation are related facts, and with the prolonging of human infancy, together with the fact that this infancy is spent with the parents in a family group, imitation has come to be, perhaps, the most important factor in acquirement of permanent adjustments.

Function and importance of imitation.—(1) *As a means of adaptation.* Normally the child lives with its parents for at least one-fourth of its life, and sees done practically all the things that it will ever have to do. Nature has so developed it that the sight of an act performed by the parents or elders serves as a stimulus for doing the same thing, and this is the basis of most that the child learns to do. Therefore imitation becomes of enormous importance not only during the period of development, but all through life; it is one of the means by which every new individual becomes adapted or adjusted. (2) *As a means of interpretation.* Royce has pointed out that imitation is a means of interpretation, serving to interpret the acts of another. It is only by repeating, ourselves, the acts of another that we can know how the other person feels or what his purpose is. Observation shows that there is usually a tendency to do what one sees another do, and particularly is this true in the case of the young. This fact is the secret of learning elocution, music, and all the arts of expression. We must do another person's act and say his words; then we have his point of view. To some extent we become the other person. Therefore, imitation serves the double purpose of adaptation and interpretation.

Development of imitation. — Imitation begins in

the latter part of the child's first year as mere sensory responses, made for the pleasure only, with no conscious end in view. But its development is rapid, and it performs a larger and larger function, till in the second year it becomes purposive; that is, the child tries to accomplish what the elder person does, by using the same means. At first, then, imitation is largely blind and reflex; the child immediately and directly does what he sees done. Then there comes a gradual growth in complexity, due in part to the general mental development, from perceptual to ideational, from crude reproductions of the activity and life about, to elaborate and exact reproductions of this life and activity. In early imitation the child is satisfied with imperfect representations of the life and activity about, but later he tries to reproduce the imitated activities with much exactness as to setting and all the details. Moreover, the social element enters and serves to extend the field of imitation. Even a brief study of children will afford abundant illustration of the evolution of imitation in the individual. For example: a straight stick will at first suffice for a horse, and performs the functions of a horse in the child's play, but as the child grows older he tries to make his *play* horse approach nearer and nearer to the likeness of a *real* horse. Also, in the imitation of adult social activities, the development is plain: at first in a play tea party the crudest representations will suffice, but when the child grows older the dishes and food and all the attendant circumstances must approximate those which are proper in a tea party of adults.

Education and imitation.—(1) *Basis of education.*

Imitation, with imitative play, performs an important function in education, and with the possible exception of play is by far the most important single factor. Let us, for example, consider the boy on the farm. He learns how to harness horses, hitch them up, feed them, how to plow and do all the other things that are done on the farm, including the manipulation of farm tools and machinery, chiefly by imitation. In like manner, the girl in the home learns how to cook and sew and perform the various duties about the house chiefly by imitation. We learn to speak our native tongue almost entirely by imitation, and there is consequently a close resemblance between the speech of parent and child. Mechanics and even professional men learn their trades and professions largely by imitation. In the school room, too, imitation rightly plays an important rôle: in learning methods of solving problems, in grammar and language, in writing, drawing, singing and in reading,—in everything that has an expression or doing side,—it is an important factor. Especially is it important in making a beginning, in acquiring the rudiments of a subject. At first, we can only imitate; later we can have a little originality. In our study of habits we shall see how important imitation is. Whenever a child has to learn and perfect a new skilful act, it is economical for the teacher to demonstrate the precise nature of the act, showing the child the exact steps of the process. Teachers do not sufficiently realise how completely imitative are the acts of the child and how little of reason and of thought there is in them. The child has this capacity for learning and adjustment long before reason can function to any great extent,

and instead of wasting time trying to appeal to reason when there is no reason, the teacher should avail himself of this capacity for learning that functions from the early months of childhood. Moreover, there is no need for reason in the great portion of early adjustments, for they are in most part merely a mechanical adjustment to our physical and social surroundings, those that natural selection has sifted out as necessary for our social life, and all that is required is that the child should come as soon as possible into this social heritage. Why should the child reason in these matters? Even if our adjustments are not the best possible, the child is certainly not able to sit as a critic in the matter and choose his course of action. He must more or less blindly take on such forms of adjustment as are already in existence. In fact, for the young, the only other mode of learning that can function much is the trial and success method, and the latter is not usually so economical as the former, though, of course, economy is not always the most important thing to consider. Both of these methods are functioning from the very beginning. The trial and success method serves to correct what might be the extreme results of learning by imitation. Certainly in the acquirement of any skill imitation is often the most important factor. Correct speech is a matter of example and imitation much more than of rules and precepts; so also are manners and morals. Our children pay much more attention to what we do than to what we say. Imitation has much to do with order and discipline in the school room. The cross and ugly-tempered teacher is likely to have a cross and ugly school. In learning

to read, perhaps as much as anywhere else, the value of imitation is apparent. A child should hear much good reading both at home and at school, and fortunate is the child whose mother and teacher are good readers. A mother should read to her children from the time when they are able to sit on her knee and listen, and when the children are older and go to school the teacher should read much, very much, to them. If the teacher is not a good reader and a good story-teller, then he should not be a teacher.

(2) *Our social inheritance.* Imitation is the means by which we come into our social heritage. Our beliefs, customs, morals, religion, traditions, language, social relations, as we have already seen, come in large measure through imitation. Since without this social heritage we should not rise above primitive, uncivilised, savage life, the significance of imitation is immediately apparent, and it is seen that as a means of transmitting the acquirements of civilisation it becomes one of the most important factors of early education. The *forms* and *moulds* of civilised life, the more or less mechanical and automatic responses that we have as members of society, we take on unconsciously by imitating those about us, as we also take on an habitual attitude toward social institutions. Imitation is the mechanism of social heredity, and it is social heredity that constitutes our civilisation.

(3) *As a means of interpretation,* imitation has almost as important educational significance. To illustrate: in the study of literature, history and the manners and customs of different peoples, dramatic imitation becomes a key to unlock what would other-

wise remain hidden, and from the first grade to the twelfth the teacher should make use of this means of interpreting the life of other people and of other times. By acting out and reproducing a piece of literature or historical event the pupil makes it real, makes it live again, while otherwise it usually remains a dead, unreal fact. Through dramatisation the fact really comes within the pupil's experience. This point of view emphasises the *doing* aspect of education. What the child *does* is no longer something foreign, but becomes a part of the child. The pupil that has acted *Miles Standish,* or *Hamlet,* or *Caesar,* or *Jupiter,* has a new relation to these characters, for in a sense he has been Hamlet, Standish, Caesar or Jupiter. The theater may some day be an important part of the school, a place for dance and song and play, a place where life is presented to the children, and where they give expression to their own ideas and conceptions of life, a place where the past and present meet, where the past becomes the present through the actions of the children.

School management and imitation. — The phenomena of imitation have an important bearing on school management. (1) The teacher. The character and temperament of the teacher are important, even his looks and health and manners. The teacher's attitude and enthusiasm toward the different studies are contagious and readily affect the children, while if the teacher dislike a subject and shows an aversion to it, the pupils reflect this attitude. The teacher's scholarship and intellectual integrity should be high and unimpeachable; his earnestness and accuracy in his work, his regard for truth, can

not be too great. And if he is to do his work well and stand the great strain of his profession, he must be a man of good health and strong body; his sense organs and all other important organs of his body should have the very highest functional capacity. He should have no defects or deformities. The men that society selects for the teachers of the young should be the highest types physically and mentally that the race affords. Not only must they be free from physical defects, but must have no oddities or peculiarities of manner or of speech. In these matters they should be typical of their time and the people among whom they work. It is a commonplace, but none the less true, that the school reflects the teacher. (2) The children. The small minority of children that are deformed, defective and deficient, with nervous disorders, defects of speech, incorrigibles, should be removed from the normal majority for the good of all, not only of the normal children, but for their own best good. There is just as much reason for removing them as there is for removing from the school those children that have contagious diseases; for, on account of imitation, these characteristics are contagious and affect the whole school. Through imitation — largely reflex — these affections spread and demoralise the whole school. One bad, disorderly boy can ruin a whole day's work at school, sometimes a whole term's work. Stammering, stuttering and other nervous disorders are taken up by many of the children in a room. Even poor work and bad scholarship are contagious. Therefore there is abundant reason for segregating those children that deviate considerably from the normal.

Not only is this to be recommended for the good of those normal children that would be badly affected by their influence, but it should be done in order to supply the proper sort of training for those that deviate. In the graded schools this is practicable and is already successfully done, but in the rural schools it does not seem to be practicable without sending the defective child away from his home, and this does not seem advisable unless the defect is extreme, such as deafness, blindness or other defect that renders him unfit to receive training from the ordinary teacher.

Contrary suggestion.—An interesting phenomenon of imitation is that of contrary suggestion. This phenomenon is in perfect harmony with the other facts of imitation, and is merely a matter of the idea of an act calling forth the act. However, there may sometimes be another element involved which is probably a manifestation of the fighting instinct, possibly of the instinct of curiosity. In certain children, and perhaps sometimes in the early life of all children, the suggestion of some line of action serves to call forth a contrary action. If the child is told to eat a certain kind of food, then he will not eat it, but if he be told not to eat it, he will eat it. It is therefore a dangerous procedure to show bad examples and call the attention of children to what they should not do or should not be. The danger lies in the fact that the example serves as a stimulus, in accordance with the general law of imitation, to call forth the action in question, and this stimulus is stronger than the inhibiting force of the teacher's or parent's warning not to do the thing in question.

No general rule, however, can be laid down to cover this matter; much depends on the manner in which the example is shown and on the temperament of the children in question. Parents ought soon to know how to deal with their own children in this regard, but a teacher can not know the children so well, and, besides, they are widely different. Teachers often bring much trouble upon themselves by forbidding children to do things that they might never think of doing if they were not suggested to them. A case that once was brought to the author's attention will illustrate the point: A new teacher came into a country district and on the first day told the boys that they must not climb on top of a shed that stood in the school yard. They had never in all the years that the shed had been there thought of getting on top of it, but now, before the end of the day, they all got up there and tore the shed down. It seems that the forbidding of a certain act sometimes not only calls especial attention to the act, but arouses the fighting spirit of the child and serves as a tantalizing stimulus which can hardly be resisted.

Children's ideals.—Our consideration of imitation leads us to the general question of children's ideals. There are in general three sources for these ideals: (1) the characters of literature, (2) the characters of history, and (3) living characters which the child may know personally or through his reading. The influence of the characters of the different groups is different for different children and in different periods of the life of the same child. Many experimental and statistical studies have been made to learn the facts concerning the ideals of children and

their development. Some important results have come out of the studies. Perhaps the most important is this: The sort of character of either literature or history that appeals to a child as a model for imitation depends on the stage of development of the child. Throughout childhood and youth, however, the character that appeals to boys especially is the character of action, — the warrior, the hunter, the Indian fighter, the fisherman, the man of the woods. The boy cares little for the man of mere static or negative goodness. Therefore the literature that should be brought to the attention of boys is that which presents to them a sturdy life of vigor and endurance. The heroes of history should be familiar to every boy almost before he can read. On his mother's knee the American boy should hear of Washington, Franklin, Lincoln, and all the great generals and sailors that have made our country's history. Deeds of valor and heroism, especially deeds of patriotism, should be made familiar to every child. The story of the early pioneers and all the stirring events of our country's early history should be told to the young children. In their early years these characters have an influence on them that they will not have later.

In the child's own surroundings it is the active and vigorous that appeals to him. He likes to watch the carpenter, the bricklayer, the ditch-digger, the blacksmith,—any one who is achieving something. It is well that this is so, and we should provide the means for the child to imitate these workmen,—means in the form of carpenters' tools and work bench and gardens. As children grow older the field from which

they choose their ideals is extended to all time and all countries. Parents and teachers in guiding the reading for children should always have the matter of ideals in mind, and should often discuss with the children the nature of the characters of their reading and draw from them their ideas and conclusions, without too much preaching. It should be one of the main functions of the high school to unlock the great treasures of literature for the pupils, and it has not done its duty if it allows a child to leave school without being familiar with Hamlet, Othello, Macbeth and all the greatest creations of literary art.

The facts of imitation make it clear that teachers, particularly the teachers of boys, should be strong, vigorous men; vigorous and manly in mind as well as in body; not weakly, lazy, effeminate, insipid young men, but men of maturity, intensely patriotic and full of our country's history and literature. Girls might very well have such teachers, too, but not altogether. Investigation reveals the curious fact that girls usually choose male ideals, and this is not fortunate nor auspicious for our future. It may be all right for the girl in her early years to have about the same ideals as the boys, but certainly later her models should be the world's great women, and this includes her own faithful mother and grandmother, with their lives of honest toil and good old-fashioned ways and notions of work and morals and true integrity.

QUESTIONS AND TOPICS FOR FURTHER STUDY.

1. Give several illustrations to show that imitation functions to interpret the environment and to adapt the individual to the environment.
2. Carefully observe children of different ages, noting and com-

paring their imitative acts. How early in the child's life does the first imitative act appear?

3. Have you ever observed imitation in domestic animals? If so, make an accurate report of it.

4. Make out a list of acts that you have learned by imitation. How does it compare with the things that you have learned to do in other ways?

5. Point out the part played by imitation in learning arithmetic, reading, writing, spelling, language, style in composition, history, geography, manners and morals, and in one's religion and politics. State whether your religion is the same as that of your parents.

6. Compare the imitative activities of children of various ages to determine what aspect of the life about them they imitate. Try to trace out the development of imitation from childhood to late adolescence from your own observation.

7. Make out a list of all the teachers you had in the public school, and indicate to what extent you imitated each, and what aspect of their lives you imitated. Were there any that you endeavored especially not to imitate?

8. Can you cite cases in which a bad parent or teacher was the cause of children leading an upright life; that is, a case in which a bad example was the cause of good action? If there are such cases, how can they be explained?

9. If you have been a teacher, to what extent did you imitate in the early part of your teaching?

10. Has some older person—parent, teacher or friend—had a profound influence on your life? If so, write an account of it, giving details as to the nature of the person and the amount and kind of influence.

11. Discuss coeducation from the point of view of imitation. Treat of elementary, high school and college education.

12. Have you ever had an ideal in history or literature that has influenced your life ? Who was the person or character, and what the influence?

13. Compare the imitative activities of country children with those of city children. Does this give any indication of the importance of imitation as a means of adaptation? Does it throw any light on the importance of environment in the life of a child?

14. Show that imitation is a great factor in moral training.

15. Make a careful comparison of imitation, as a factor in learning and development, with all other factors.

16. When you have the opportunity as a teacher, make a study of the ideals of children along the lines suggested by the studies of Barnes, as indicated in the second volume of the *Studies in Education.* (See references.)

17. Give data from your own experience or observation to show the great importance of ideals in adolescence.

18. Cite cases showing the effects of the attitude of a teacher toward studies; his attitude toward important principles of life and action.

19. How can the very highest type of man be secured for the teaching profession? Read Cattell's article on *The School and the Family*, in *Popular Science Monthly*, Vol. lxxiv, p. 84. Do you think it possible for such teachers as he indicates to be secured for all our schools? Should we work toward some such ideal? What should be the first steps toward it?

20. A student in one of the author's classes once reported that in a teachers' examination which he had just attended nearly all the applicants for certificates cheated. Why did they do it? Should they be allowed to teach children? If a teacher is dishonest in getting his license to teach, is he likely to be an honest and truthful teacher?

21. Should officials who examine teachers be as careful about the character of the applicant as about his scholarship?

22. Show fully the use that can be made of dramatisation in the different grades and the different subjects. Point out especially how it can be a means of interpreting the life of other countries and other times.

REFERENCES.

Kirkpatrick, *Fundamentals of Child Study*, Ch. viii; *Genetic Psychology*, 1909, p. 124; M. V. O'Shea, *Social Development and Education*, 1909, Ch. xvii; J. Royce, *Psychological Review*, Vol. ii, p. 217; *Century*, Vol. xlviii, p. 137; R. Steel, *Imitation*, 1910; A. E. Tanner, *The Child*, 1904, Ch. xv; J. M. Baldwin, *Mental Development, Methods and Processes*, 1900, Chs. vi, ix, x, xi and xii; C. Frear, *Ped. Sem.*, Vol. iv. p. 382; E. M. Haskell, *Ped. Sem.*, Vol. iii, p. 30; E. L. Thorndike, *Animal Intelligence*, 1898, pp. 47-64; A. J. Kinnaman, *American Journal of Psychology*, Vol. xiii, p. 196; L. W. Cole, *Concerning the Intelligence of Raccoons*, in *Journal of Comparative Neurology*, Vol. xvii, No. 3; H. Münsterberg, *Psychology and the Teacher*, 1909, Ch. xix. On children's ideals, E. M. Darrah, *A Study of Children's Ideals*, in *Popular Science Monthly*, Vol. liii, p. 88; W. G. Chambers, *The Evolution of Ideals*, in *Ped. Sem.*, Vol. x, p. 101; E. Barnes, *Children's Ideals*, in *Ped. Sem.*, Vol. vii, p. 3; *Type Study of Ideals*, in *Studies in Education*, Vol. ii, pp. 37, 78, 115, 157, 198, 237, 319, 359, 392.

Chapter X.

HABIT.

Nature of habit.—Habit may be defined as a definite, acquired response to a definite stimulus. It differs from instinct, as was pointed out in chapter IV, in being a type of response whose definiteness has been acquired and fixed in the lifetime of the individual. There is no essential psychological or physiological difference between these two forms of action; they differ only in the matter of their origin. The instinctive response is one whose co-ordination, with its stimulus, is provided for in inherited structures and does not have to be learned and perfected by practice. But an habitual response is one that is learned, perfected and fixed by practice, by repetition. The nervous system is but a means of connecting and co-ordinating the muscular response of an individual with the impressions of the external world. Now, those responses that are most essential and fundamental to the life of the animal become insured by the fixing, through heredity, of the nervous connection between sense organ and muscle, binding together stimulus and response, so that when the stimulus is first presented to the individual the response comes with considerable definiteness and precision. Such a response is instinctive and is the result of natural selection acting upon the animals of a species. When a movement becomes so neces-

sary in the life of an individual that it is repeated over and over again, its connection with its stimulus or the situation that calls it forth becomes more and more definite, and the probability that the given stimulus or situation will evoke the same response becomes greater and greater. The nature of the nervous chain which functions to join stimulus and response is doubtless the same in the two cases.

James,* who has written the best chapter on habit, says: "The moment one tries to define habit, one is led to the fundamental properties of matter. The laws of nature are but the immutable habits which the different elementary sorts of matter follow in their actions and reactions upon each other. In the organic world, however, the habits are more variable than this. * * * The philosophy of habit is thus, in the first instance, a chapter in physics rather than in physiology or psychology. That it is at bottom a physical principle is admitted by all good recent writers on the subject." James then proceeds to give examples in the physical world of the analogues of habit in the organic world. The river sticks to its channel after it has cut it deep in the earth, a lock works better after it has been used, a coat 'sets' to the back of its owner. If a flat piece of glass has a drop of water put upon it, and is then tilted slightly, the drop wanders rather slowly and uncertainly across the surface of the glass. But if another drop is put in the same place and the experiment repeated, it moves off readily in the path of the first. These analogies may not throw much light on the nature of habit, but they may very well serve to call our atten-

*Principles of Psychology, Vol. i, ch. iv.

tion to the fact that the ultimate explanation of habit is doubtless physical or chemical. The bare fact seems to be, as far as we know it, that the passage of a nervous discharge along a certain path facilitates future discharges along the same path. And in general the more often the same impression is followed by the same neuro-muscular change, the more certain and definite the physiological connection seems to become. Not only does every repetition serve to fix the habit, but the fixing of the habit goes on to some extent between repetitions. It has been said that the nervous system "grows to the modes in which it has been exercised," that we "learn to swim in winter and to skate in summer." This means that our habits are being formed not only while we are actually repeating the act, but also between times. To some extent the nervous system is built up around the paths once marked out. The actual nature of the change that has taken place in the nerves is not known, but it must be some sort of chemical or physical rearrangement of particles that makes easy a nervous discharge along the accustomed path. Without speculating concerning the ultimate basis of habit, the psychologist is warranted in assuming a physiological basis. The neuro-muscular system develops and 'sets' along the line of its exercise.

Function of habit.—The results that are accomplished for an individual by habits are both biological and psychological. (1) *The biological results.* (a) Habit perfects a response by making it more accurate and therefore better serve its purpose. Some illustrations will make the point clear. Suppose one wishes to throw a ball and hit a mark. The first

throws go wide of the mark, but with practice they go nearer and nearer to the mark. With much practice, extending over many months and years, a person can throw with great accuracy. The learning of any performance demanding skill shows the same thing: typewriting, piano playing, driving nails, sewing, knitting, and even expressing one's thoughts in spoken or written words. In each there is a progress from poor performance to accurate performance. Habit, then, first of all, secures the accurate performance of a response. (b) Not only is the habitual act ordinarily performed more accurately than before habituation, but it is performed more quickly. The person learning typewriting not only improves in accuracy, but also in speed. The beginner at typewriting makes more mistakes and at the same time goes more slowly than does the experienced performer. The mathematician increases his speed as well as his accuracy. In any field of activity where one moves accurately, one moves also quickly. The experienced surgeon performs the most delicate operation with great dispatch. The carpenter, the blacksmith,—the experienced workman in every field,—has both accuracy and speed. It is the inexperienced workman that is slow, inaccurate, awkward. (c) It follows that the habitual act is performed with less waste of energy. Unnecessary movements are eliminated; the stimulus goes over directly to the appropriate response without being side-tracked to unnecessary movements. It is indeed because of this close, definite, mechanical connection of stimulus and response that the act is performed with more accuracy and speed. The inexperienced

tennis player is soon exhausted because of the tremendous energy unnecessarily expended in *receiving* and *serving* the balls. Nearly every muscle in the body is brought into service. Not so with the accomplished player; for him the unnecessary movements are eliminated; long practice has co-ordinated and mechanised for him all the various movements. A ball approaching in a certain fashion is met by a definite sort of stroke. The best player is the one that has best perfected the various movements. If one watches a child or even an adult trying to perform a new and difficult act, one can see the indications of waste of energy in grimaces, writhing, twisting of the body in awkward, unnecessary movements. These superfluous movements disappear with practice, and, as a rule, the most efficient performer of any act does it with the greatest ease, with the least effort. (d) The habitual act is performed with less fatigue, doubtless, in part at least, because of the elimination of unnecessary movements and the close mechanical connection of stimulus and response. There may be less fatigue partly because the body is actually better able to perform the act because of practice. The muscles involved actually have more strength, and there may be more nervous energy available. Use adapts the organism for the response. Because of this adaptation the organism has more capacity for endurance. It is the novice that gives out first in any performance. The inexperienced walker gives out in an hour or two; the habitual walker can go all day with ease. The boy learning carpentry soon tires of driving nails; the experienced carpenter can work all day long and day after day. Capacity to endure,

whatever may be the causes, is one of the important results of habituation. (e) Not only does habituation accomplish the above improvements for the organism, but it makes the appropriate response *more certain* upon the appearance of the required situation; more certain, because more mechanical and direct. The nervous path involved, because of having been so frequently used, with ever more and more fatality, carries the stimulus into immediate and certain action. Therefore, the biological function of habit might be said to be to perfect a response and preserve it in its purity, securing the greatest possible efficiency with the greatest possible economy of effort.

(2) *The psychological results.* (a) The process of habituation tends to take an action outside the realm of active attention. The action that at first has a high clearness value, is rich in conscious content, by repetition drops to a lower conscious level. In the repeated performance of any act the progress is toward automatisation and mechanisation of movement and *away from* richness in conscious content. In other words, the habitual movement has little conscious accompaniment, and indeed it is possible to carry it to the point of complete automatisation till it has the characteristic, almost, of a simple reflex. In such cases the movement is turned over to the lower nervous centers and may be completely outside the realm of consciousness. This end, the mechanisation of movement, is the goal toward which all repeated movements tend. (b) While the conscious aspect of an habitual movement is poor in sensory and ideational content, its affective change is not quite so

simple, for there clearly is not simply a loss of affective value, but rather a change to pleasantness. Habitual movements seem to become a necessity of the organism in much the same way that instinctive movements do, and therefore pleasurable. Moreover, the fact that they are performed with ease and without much fatigue would indicate their pleasurableness, for, as a rule, what we do with ease we do with pleasure. At any rate, whether the acquiring of a pleasant affective accompaniment is universal or not, it must be true that the loss of any unpleasant accompaniment is general. Of course, there may be conditions accompanying the performance of an habitual act that bring unpleasantness, but it is not due to the act itself. One may tire of doing the habitual act just as one may tire of doing the instinctive thing. There seems to be at least a vague content and satisfaction with having done the habitual thing, and this fact becomes quite evident when a person or animal is prevented from doing the long habituated thing. The long performance of an act seems to make that performance necessary for the health and well-being, sometimes even the life, of the animal. When a habit is broken off there may sometimes be pleasure at first from the change, but there usually comes a yearning for the old performance, a desire for the old activity, that sometimes can not be resisted. Doing the accustomed thing, then, gives at least a vague content and satisfaction that becomes apparent when the habitual act is interrupted. It must be noted here that muscular movement, from whatever point of view it is considered, has tremendous significance for animal life. The organised

movements of an individual, instinctive and acquired, largely determine the individual's needs and pleasures. (c) Fatigue is both physiological and psychological, *i. e.,* there is exhaustion of energy and there is a feeling of exhaustion. It follows that the decrease of fatigue from habituation is one of the psychological results. (d) Another psychological result is a feeling of confidence that one has toward an act that one can perform with skill. After long performance of an act one acquires such skill that the performance can be approached with confidence, without fear of failure, because long experience has taught the person just what can be done. The performer knows just what the possibilities are. The very fact that the task is approached with a feeling of confidence and surety makes success more likely. The psychological function of habit is, therefore, to remove the necessity of active attention. With the habituated action in the background of attention, it is then possible for other processes to occupy the focus of attention at the same time that the habitual action is going on. It is interesting to contemplate what life would be without habit. If all our actions were always performed as if for the first time, life would be difficult, to say the least. Dressing, and eating three meals a day would use up our energy and take the most of our time; but, thanks to the effects of habit, nearly all these routine actions of every day occurrence go on of themselves without the aid of consciousness, which is accordingly relieved for other and higher functioning.

Importance of habit in education. — We have learned that education is a process of adjustment, an

apprenticeship in learning the world and acquiring a set of responses that will enable the individual to live. He must learn the nature of the various things in the environment,—how they act and how he must act in their presence. As the years of an individual's development go by a system of responses is built up and perfected. By the end of the first third of life this system is fairly well complete. Whether the child goes to school or not, in this sense, he is educated; some sort of system of action is perfected and fixed. And within the limits set by the instincts any sort of system is possible. Lying, murder, stealing, robbery, deceit are possible, as well as truthfulness, honesty, acts of sympathy and helpfulness, and all other forms of virtuous action that lead to mutual happiness. The schools are an institution of society that undertakes to guide and control the formation of habits that will be for the highest social good. The twofold function of education is quite plain: (1) On the one hand, it can guide and assist the child in acquiring knowledge, and (2) on the other hand, it can perform the same function in the matter of habit-formation. In the past the knowledge side of education has been emphasized and the habit side largely neglected. Indeed, it has often been forgotten that the acquiring of knowledge is but a part of education, that knowledge is only a means, that it should always point to action. Education should be as much concerned with guiding, perfecting and fixing an individual's responses as with the organisation of his ideas to guide these responses. There is no question that every individual soon becomes largely a creature of habit. It is the business of education to guide and

aid in securing the formation of such a system of habits as will serve the highest interests of the individual and society. As soon as a child is born habit-formation sets in,—at first in such matters as time and manner of taking food, time, place and manner of going to sleep, methods of getting what it wants, etc. The process goes on, soon including manner of speech, of eating, of walking, of writing, of reading, relation to others, continuing for twenty-five or thirty years till a system is perfected that meets the individual's needs. It may be that it meets them more inadequately than would some other system, but it *meets* them. The rule is that this system of responses thus acquired and perfected suffices for the rest of life with little modification. The individual is henceforth very much a machine, reacting largely mechanically, with rather definite ways of meeting the various situations of life. There is no way of avoiding this outcome of individual development. And, on the whole, it is well that as many of life's reactions as possible be mechanised and handed over to the lower nerve-centers. The utmost that education can hope to do is to keep the individual plastic until the highest possible forms of responses for the various situations of life can be acquired and fixed. But it is nonsense to talk about keeping the individual permanently plastic; *set* he will and must. And fortunate we may consider the individual if we can prolong his infancy till he acquires what may be considered a fairly adequate form of response.

The view of education as the conscious attempt of society to assist the child in organising his knowledge of the world and in perfecting and habituating

his responses can not be too clearly kept in view. And the possibilities and limitations must never be forgotten. On the knowledge side we can assist the child in acquiring knowledge and to some extent determine what knowledge it will acquire. On the habit side there are great possibilities. Sufficient wisdom, patience and care on the part of elders enable the normal child to reach maturity with the great majority of his necessary reactions reduced to a fair degree of automatisation. Speaking, writing, reading, social responses, the various routine actions of every-day life, and even moral and professional actions, can, for the most part, be reduced far toward the plane of unconscious mechanism. It shall be our concern in the pages that immediatelly follow to work out the laws that control the process of habit-formation so that we may know how to proceed intelligently to guide and assist in their formation. It is evident that the curriculum should be examined and analysed into the ideas to be organised and the habits to be formed, and that the methods used must be adapted to the end to be attained. If habits are to be formed, then the procedure must be what psychology dictates as being in accord with the laws of habit-formation.

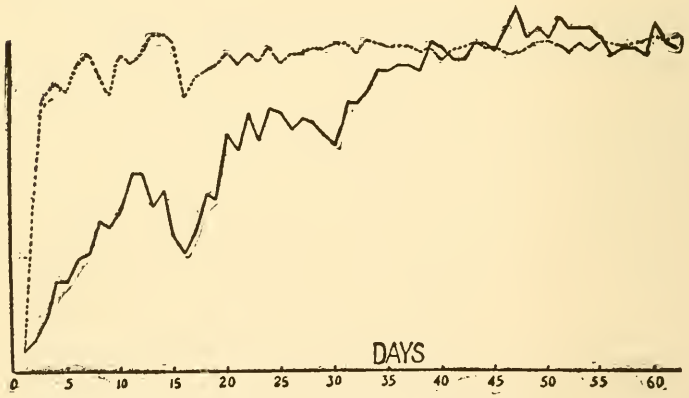
The ethics of habit.—Chapter XII is devoted to the subject of habits and morals, but a brief, general statement is not out of place here. From what has been said above, it is evident that habit plays the same rôle in all forms of action, whether of moral significance or not. All the moral actions of our mature life will have habit as their basis. The important function of habit here can not be better ex-

pressed than in the classic words of James:* "Habit is thus the enormous flywheel of society, its most precious conservative agent. It alone is what keeps us all within the bounds of ordinance, and saves the children of fortune from the envious uprisings of the poor. It alone prevents the hardest and most repulsive walks of life from being deserted by those brought up to tread therein. It keeps the fisherman and the deck-hand at sea through the winter; it holds the miner in his darkness, and nails the countryman to his log-cabin and his lonely farm through all the months of snow; it protects us from invasion by the natives of the desert and the frozen zone. It dooms us all to fight out the battle of life upon the lines of our nurture or our early choice, and to make the best of a pursuit that disagrees, because there is no other for which we are fitted and it is too late to begin again. It keeps different social strata from mixing. Already at the age of twenty-five you see the professional mannerism settling down on the young commercial traveler, on the young doctor, on the young minister, on the young counsellor-at-law. You see the little lines of cleavage running through the character, the tricks of thought, the prejudices, the ways of the 'shop', in a word, from which the man can by and by no more escape than his coat sleeve can suddenly fall into a new set of folds. On the whole, it is best that he should not escape. It is well for the world that in most of us, by the age of thirty, the character has set like plaster and will never soften again."

*W. James, *Principles of Psychology*, Vol. I, p. 121.

Laws of habit-formation.—The perfection and definiteness acquired in the process of habituation depend directly upon the number of attentive and pleasurable repetitions and inversely upon the number of exceptions. These facts may be expressed in the formula,

$$\text{Perfection and definiteness of response} = \frac{\text{Repetitions} \times \text{vividness} \times \text{pleasure}}{\text{exceptions}}$$



Habituation curves. The dotted line shows the improvement in accuracy and the continuous line shows the increase in speed, brought about by daily practice with the typewriter.

Repetition. — The process of habituation brings about, as we have seen, on the biological side, some sort of neuro-muscular reorganisation that definitely and mechanically connects stimulus and response, and, on the psychological side, the dropping of the action from focal to lower level attention. In this development repetition is one of the most important factors. If, for example, we wish to establish the connection between stimulus X and response Y, we

must get the response in the first place, and then have it repeated over and over again for days and months, and in some cases years. This repetition serves to mechanise the process. Other things equal, the greater the number of repetitions, the more perfect and mechanical do the physiological processes become and the less conscious value do they have. These two factors, the physiological and the mental, vary inversely. The more definite and mechanical the habit becomes, the less of conscious value it has. This inverse relation of consciousness (C) and mechanisation (M) and their mutual dependence upon repetition (R) may be expressed in the formula, $R = \frac{M}{C}$. These formulas can be true, of course, only in a general way, and are given in the hope of aiding the student to hold in mind the general tendencies of the factors involved in habit-formation. The data necessary for making these formulas mathematically exact are not yet available. Sufficient experimental work has been done to show that within certain limits mechanisation bears a direct relation to repetition. However, if we measure mechanisation by speed and accuracy, it does not ordinarily proceed evenly. There are usually periods of rapid mechanisation followed by periods of slow mechanisation. If we take the average daily progress, then we can have a definite formula to express it,—repetition equals mechanisation multiplied by a constant. And although the mechanisation, so far as we can measure it, proceeds by jumps, it doubtless is fairly uniform if only we can keep the conditions constant. And the so-called "plateaus" of learning are doubtless as

effective in producing mechanisation as are the repetitions that actually show the improvement. So that we are probably justified in taking the average daily improvement as the rate of mechanisation. But we do not have sufficient data to enable us to speak with confidence concerning the decrease of attention to the act in process of habituation. We know in a general way that the action steadily passes to a lower level of attention, but the exact statement of the quantitative aspects of this passage from the focus of attention to a lower level awaits a careful introspective analysis.

One of the best illustrations of the effect and use of repetition comes from childhood and is due to imitation. Children, as we saw in chapter IX, are imitators. The desire and tendency to reproduce what they see done is one of the strongest and most important aspects of their nature. What interests us here is not merely the fact that they imitate, but that they *repeat the imitative process over and over.* We have already pointed out that imitation is the result of natural selection. In the evolution of our race the individuals that imitated survived because of the following fact: repeated imitation of the actions of the grown people about them led to the formation in the children of habits of response that served to adjust them to their environment. Here we have an aspect of child nature essentially instinctive, whose function is the formation of a system of habits that will serve as an adequate adjustment in a social life so complex that special instincts no longer sufficiently serve the individual's needs. Language, for example, is an important factor in social and civilised life. The

basis of language is habit; the matter of acquiring language is almost entirely one of imitation. The child, usually within the first year, begins to repeat the sounds that he hears,—over and over again he says them,—*mamma, mamma, mamma,* and *papa, papa, papa,* etc., perhaps hundreds of times a day. And in the second year, as the names of things are learned, the sight or sound of an object serves to call forth its name, and the child is not satisfied with saying it once, but must repeat it, often many times. This process soon gives a child control of a language. Nature is an efficient teacher. A study of her methods reveals the fact that persistent, unending repetition is one of her important methods.

The effects of repetition may be further shown by a consideration of the learning of typewriting. In typewriting the idea or perception of a certain word is followed by striking certain keys in a certain order. At first the performance is slow and uncertain, but by continued repetition the learner improves in speed and accuracy; more and more definite and mechanical becomes the response, less and less consciousness attends the movements. The repetition leads to the mechanisation of the movement, with the freeing of consciousness from attending to it. In the early period of learning consciousness is engrossed with the movements, and the *meaning* of the words written is not focal for attention. In this stage the management of the typewriter demands all the attention of the learner. Gradually the movements concerned in striking the keys and operating the machine become mechanical and drop to a low level of attention; then the meanings of the words may be-

come objects of the focal processes for consciousness. As a result of repetition, then, the operation of the machine is more rapid and accurate, and at the same time demands less attention.

Repetition in attention.—Not only must a process be repeated to secure habituation, but mechanisation is more quickly secured if the repetitions at first are *vividly* present in consciousness. For repetitions to be most effective the action must be focal in attention. In other words, the more we attend to a process at first, the earlier we can afford to neglect attending to it; and the less attention to the movements in the process of learning, the longer the process of habituation. Repetition, then, to be most valuable must be at the height of attention. One reason why the imitative repetition of the child is so effective is because it involves the child's whole consciousness,—his whole being goes into his act. And one reason why the work of the school room is so ineffectual is because it does *not* involve the whole consciousness, but is often done on a low level of attention, while other processes occupy the focus.

Pleasurable repetition. — Intimately connected with the fact of attention is that of interest. An interesting performance is one performed with accompanying or resultant pleasure. The higher the affective value of a repetition, the more it contributes to habituation. This factor, as well as attention, gives value to imitative repetition. The child not only gives his whole attention to what he does, but he takes immense pleasure in it. His whole being goes into the performance; there is nothing of a half-hearted nature about it. The natural activities of

early life that are the expression of the maturing instincts are always pleasurable. It is for this reason largely that, as the child repeats his actions in play and imitation, he quickly acquires great facility. In our more or less blind and awkward attempts to secure repetition in later life we seldom approach the conditions of attention and interest that are common in the spontaneous activities of childhood. But the key to success in teaching is, without doubt, to use the method of nature that underlies the education of our earlier years. Fortunate is the teacher who has had the opportunity to observe the growing child. Consider, for example, a child learning to feed itself in the early part of its second year. He manipulates the spoon with great awkwardness, he gets little food from it, but he insists on feeding himself none the less. Great is the joy that he gets from it and great is the attention that he gives to it. The same fact is noticed when children are learning to dress themselves. They often show great anger if some one fastens a button for them, although it may save them a great deal of time. The act of dressing and undressing gives them much pleasure when they are just learning the performance. It is easy to see how natural selection would develop such qualities. A child that took no delight in feeding or dressing itself would never learn to do these things and would have a poor chance of survival. The child is a creature of instinct. The instincts have a high affective value, therefore the instinctive repetitions of early life quickly lead to habituation. This fact is suggestive for education. If we can graft our habits upon some instinct or other, their formation is easy

because of the above facts. Since inattentive, uninteresting repetition is largely ineffectual, those who undertake the direction of habit-formation must seek to identify the desired response with some instinct or some great natural need of the child.

Two further facts must be mentioned in this connection. Since the value of a repetition depends on its pleasurableness and vividness, drill periods and practice periods should be short and often repeated, for if the repetition continues for any great length of time it takes place without attention and pleasure. The effectual drill is short and performed at the highest point of mental efficiency and often repeated. This is an important fact for teachers to learn, for much of drill work has been a monotonous 'grind' that accomplished next to nothing. The second factor that is important here is that of fatigue. When fatigue sets in, attention and pleasure ordinarily decline, unless large instinctive resources are being drawn upon. For children, ten or fifteen minutes are quite enough for practice at one time, and in the case of adults there is a large decrease in efficiency in the latter part of an hour's practice or drill.

Habit and attitude.—Habit has an important relation to attitude, probably because of the relation of attitude to attention and pleasure. One of the laws of attention is that what fits into one's attitude, one's general mood or frame of mind, will attract attention. Since attention is necessary to valuable repetition, it is important that children have the proper frame of mind before practice begins. Another aspect of attitude is very significant: When one has a habit in process of formation, and allows an excep-

tion to occur, it often results in a complete change of attitude toward the act involved. One changes, in such a case, from an attitude of certainty and confidence to one of uncertainty, from strength to weakness.

QUESTIONS AND TOPICS FOR FURTHER STUDY.

1. Make a list of acts performed in a day that may be called habits. Indicate, in each case, the *stimulus* and the *response*.
2. Point out the physiological and psychological results of habituation for each habit enumerated in answer to No. 1.
3. Illustrate, from your own experience, the laws of habit formation as expressed in the two formulas in the chapter. Take account of attention, pleasure, repetition, exceptions.
4. Have you ever habituated an act that was at first unpleasant? If so, did the unpleasantness disappear? Did the act become pleasant later?
5. Do you now perform any habitual act that is unpleasant? Is the unpleasantness due to the act itself or to attending circumstances? Cite all the evidence you can that seems to show that the statement of the text concerning the pleasurableness of habitual acts is not true.
6. Mention some habitual acts that are devoid of all feeling. Are they not far on the way toward automatisms?
7. Name some of your oldest habits. How do they compare with instincts in their definiteness?
8. Apply the principles laid down in the chapter by experimenting for one month in forming a habit. Keep a complete record of the whole experiment. If it is possible to do so, plot a curve showing the progress in mechanisation, using speed and accuracy as criteria of mechanisation. Before beginning the experiment make an outline of it and hand in to the instructor for criticism.
9. Give from your own experience illustrations showing the effect of attitude on habit.
10. Give illustrations of habit in domestic animals. How were the habits formed?
11. Suppose that a person is practicing on the violin and the arms get tired, although attention and pleasure are still maintained. Can the practice be continued profitably? and if so, how long? If not, why not?
12. Suppose a bad habit has been broken for several years. Is there any danger of backsliding?
13. Plan a method of breaking a habit that has become an automatism.
14. Do you think a person learning to play the piano can practice profitably for three or four hours at a time?

15. Have you ever formed a habit against your will?
16. How account for the fact that some people are better teachers when young than when they are older and have habituated their various procedures?
17. Give illustrations of various professional habits. Make a list of professional mannerisms that you notice in a day.
18. Find what percentage of people over 40 have changed the religion of their early days.
19. Is there such a thing as a habit of thought? Explain fully.
20. Can one repetition form a habit? Explain.
21. Do habits work against progress? Show how they may work *for* progress.
22. Have you known of old people changing their place and manner of living? If so, give account of the results.
23. What aspect of habit formation is most difficult? Answer from your experience.
24. Are there any habits not based directly on instinct?
25. Can you give apparent exceptions to the statement that habituation gives confidence?
26. In the formation of a habit, what makes it possible to couple up the response and stimulus the first time? Illustrate.
27. Deal out a pack of cards according to a certain scheme until you have acquired considerable speed, then deal them according to a different scheme and note the interference of the first habit.
28. If you have ever carried a watch for a long time and then changed the watch to a different pocket, what was the result? Give other illustrations of similar nature.
29. Did you ever remove your coat to prepare for dinner and continue to undress as if preparing to retire? What is the principle illustrated by such a procedure? If a man remove his vest in the daytime, he is almost sure to wind his watch. Why is this?
30. Are people who marry late in life as likely to get along well together as those who marry earlier? What principles are involved?
31. Attention often interferes with the performance of an habitual act. Why is this?
32. Can you give an illustration showing the relation of habit to sickness?
33. Why is it difficult to form new habits late in life?

REFERENCES.

FOR GENERAL TREATMENT:

W. James, *Principles of Psychology*, Vol. i, Ch. iv; *Psychology, Briefer Course*, Ch. x; in *Popular Science Monthly*, Vol. xxx, p. 433; *Talks to Teachers*, 1906, Ch. viii; S. H. Rowe, *Habit-Formation*, 1909, Chs. i-v; B. R. Andrews, *Habit*, in *American Journal of Psychology*, xiv, p. 121; W. C. Bagley, *The Educative Process*, 1905, Ch. vii; J. R. Angell, *Psychology*, 1908, pp. 66-74; C. H. Judd, *Psychology*, 1907, Ch. viii; R. M. Yerkes, *Introduction to Psychology*,

1911, pp. 401-408; P. Radestock, *Habit and Its Importance in Education*, translated by F. A. Caspari, 1886, still worth reading; E. L. Thorndike, *The Principles of Teaching*, 1906, p. 110; E. A. Kirkpatrick, *Genetic Psychology*, 1909, pp. 111-126.

ORIGINAL STUDIES: W. L. Bryan, *On the Development of Voluntary Motor Ability*, in *American Journal of Psychology*, Vol. v. p. 125; W. L. Bryan and N. Harter, *Studies on the Telegraphic Language: The Acquisition of a Hierarchy of Habits*, in *Psychological Review*, Vol. vi, p. 345; E. J. Swift, *Mind in the Making*, 1908, Ch. vi; also *Studies in the Psychology and Physiology of Learning*, in *American Journal of Psychology*, Vol. xiv, p. 201; W. F. Book, *The Psychology of Skill, with Special Reference to Its Acquisition in Typewriting*, 1908; W. G. Anderson, *Studies in the Effects of Physical Training*, in *American Physical Education Review*, Vol. iv, p. 265; J. H. Bair, *The Practice Curve*, in *Psychological Review, Monograph Supplement*, No. 14 (1902); T. L. Bolton, *Relation of Motor Power to Intelligence*, in *American Journal of Psychology*, Vol. xiv, pp. 622-631.

Chapter XI.

HABIT AND EDUCATION.

The nature of habit and the principles that underlie its formation have already been set forth. In this chapter we shall consider the problems that arise in the application of these principles.

The function of the teacher.—It is worth while to get a clear notion of what the teacher can do to assist the young in the formation of habits. (1) First of all, the teacher should know clearly the nature of the habits to be formed; he should have a thorough knowledge of the curriculum, and, as Dr. Rowe has pointed out, know the nature of its different parts; know what is largely a matter of ideas to be acquired and what is largely a matter of habits to be formed. Every branch of study has both aspects, both a knowledge side and a skill side. But some branches, as history, literature and science, are predominantly matters of ideas, information; while others, as drawing, painting, singing, reading, writing, much of mathematics, are largely matters of skill to be acquired. The teacher must have this broad and fundamental knowledge of the course of study and of the nature and relation of its various parts in order to be able understandingly to direct the work of the pupil. In addition to this general knowledge, he should be able to analyse a subject into its various elements and know well the object of each step, each lesson in the pupil's progress. For example, if the

object of a lesson is to automatise a part of the multiplication table, then one procedure is required; if, on the other hand, the object of the lesson is to learn the cause of eclipses, a different procedure is required. Here, of course, we are concerned only with those studies or parts of studies that involve the formation of a habit. Suppose, then, the teacher knows the object of a lesson to be the formation of a habit; his next duty is (2) to explain the habit desired to the pupils. It may be that usually certain ideas are first to be developed, then processes habituated. After the development of the ideas, the teacher should explain and demonstrate each step in the processes that are to be habituated. To illustrate, suppose the lesson is to learn how to extract square root. What square root is, is first explained, then the various steps in finding it are worked out and clearly demonstrated. The teacher must have in mind a well defined method and adhere to it after first explaining and justifying it. In the case of young pupils, procedures will often be learned before the principles underlying the processes are known, but this does not concern us here and has nothing to do with the formation of the habit. In any case, the teacher should fully explain and demonstrate the separate steps in their proper order. In the example cited the procedure might be: (a) point off the number into periods of two figures each; (b) find the largest number whose square is not larger than the first period; (c) put this down as the first figure of the root; (d) square this figure and subtract the square from the first period of the number; (e) bring down the next period; (f) for a trial divisor, annex a

cipher to the root found and double it; (g) find how many times this trial divisor is contained in the present dividend, making allowance for the completed divisor; this gives the next figure of the root, and it is then substituted for the cipher in the trial divisor, giving the completed divisor, (h) which is then multiplied by the new figure of the root and the product subtracted from the dividend; proceed as before. Every particular of the procedure is to be explained and made clear by abundant illustration, and to be sure that the pupils understand it, before they are put to work at solving problems by themselves, the teacher should have them solve a few problems while he is present to correct the mistakes. This brings us to the next function of the teacher, which is (3) to set the pupils right and correct the errors that they make at the beginning of the process of habituation. Neither the teacher nor the pupil knows whether the pupil understands a process until the latter is put to the test. Therefore the economical way is to set the learner right at the start, to take infinite pains at the beginning. (4) Closely allied to the preceding is the matter of requiring the pupil to master important details in the series of processes. Quite often complex habits are not well formed because the pupils are not kept long enough on the separate and important details. Ease of performance is never attained till the details are mastered and habituated. Children are content to stop practice with a fair degree of mastery, and too often the teacher is willing that they should, but he can render one of his greatest services by holding the children to the mastery of all essential details in the process to be habit-

uated. (5) The teacher can greatly assist the child by supplying a motive for acquiring the habit in question. This is what Dr. Rowe calls getting *initiative*. The teacher can help here by making clear to the pupil the necessity of the habit in question. Indeed, the pupil can be made to feel this need very keenly by finding his equipment inadequate to his needs and by noting the ease by which others who have formed the habit can do what he himself can not do. In addition, the teacher can see that the child reap the benefit of every little advance toward habituation and be allowed the satisfaction that comes from achievement. He can do much also by words of encouragement, by calling attention to progress, and in other ways inducing good feeling in the child.

Repetition, practice.—The problem of drill is one of the most difficult that the teacher ever has to meet. It takes a great amount of practice to make a skilful performer at anything, — the pianist, typewriter, stenographer, accountant become expert by long and persistent practice. Ease, accuracy and speed in spelling, reading, writing, adding, etc., come only at the cost of much energy spent in drill, in repetition. By drill here we do not mean merely formal drill, but any and all manner of repetitions by which the process becomes fixed. As far as establishing the habit is concerned, it makes no difference whether the repetitions are in the form of formal drill or are made a necessary part of some larger performance; no difference so long as the psychological and physiological conditions that have been mentioned are maintained. There is no reason why the schools should try to get away from all drill and practice

pure and simple. Where drill can be carried on at the highest point of efficiency, and the drill is necessary for the fixing of a habit, there is no use bothering about making the drill merely incidental, unless there are other considerations. Those who claim that drill should be merely incidental certainly have no right to say that they are following the method of nature, for nearly all the time of the early years of childhood is spent in continuous repetition of whatever the child is able to do. The problems presented by drill are many, such as the length, frequency, conditions and kinds. Experimental psychology can not yet fully answer all the questions involved. As already indicated, the drill period should be short; not longer than a high degree of attention and interest can be maintained. Vigorous drill can hardly occupy a period of an hour for an adult, and for children the period is much less, the length depending on age and individual differences. A half-hour of attention sustained at the highest point does pretty well for adults, and half that time for children. The proper frequency for drills or practice is not yet determined. Although it seems probable, in the light of recent experiments, that daily practice periods are better than practice twice a day or on alternate days. It is probably true that for adults two half-hour periods of practice daily are better than one single hour period. But, one practice a day, to the point of fatigue, is probably best. It is not economical, as regards the total amount of time, to push practice to an early conclusion. The formation of a habit is to some extent a growth, and growth takes time. A neuro-muscular organisation is involved, and a cer-

tain amount and frequency of repetition are most favorable for this organisation. Pushing a habit to an early fixation may sometimes be necessary and desirable, but it is not economical from the point of view of total amount of time. After a child has practiced an act for a certain length of time, further practice at that time is nearly useless; so also is practicing useless till an interval has elapsed. Teachers probably make a mistake when they try to perfect a habit in a short time. In the light of our present knowledge, it would probably be the best procedure to keep up frequent and vigorous drill for a time and then allow some days for a rest. But drill should not be finally dropped till a fair degree of fixity is attained. The conditions of drill are important, inasmuch as they must always be such as to furnish the proper degree of interest and attention. All the attending circumstances may be varied, but the act itself must not be varied. Two times three must always be six, but it can be six in a great variety of situations. Children should always be fresh for practice periods, and the most favorable times of the day should be taken for them. It is much easier to maintain attention and interest in presenting new ideas than it is in repeating what has already been done. And a teacher will save much time and energy by carefully distributing the periods of practice and varying the conditions so as to maintain the proper mental attitude for the right results. Dr. Rowe has given some good, practical directions for aiding pupils that have a habit to form. He suggests that a definite number of repetitions be set for a definite time and place. If, for example, the matter is a new

trick in arithmetic to be habituated, a definite number of problems should be set to be solved at a definite time and place. And it is doubtless well to go into just such details as these. It is not sufficient after establishing a new principle to say, "Now you must practice this." But rather the teacher should say, "Tonight, at eight o'clock, go into your room, where it is quiet, and do this ten times."

Exceptions. — The psychology of exceptions has already been discussed, but a word on the application of these principles is in order. The teacher has two important duties here. The tremendous importance of preventing exceptions should be made plain to the pupils. And, in addition, the teacher can do much to help the child in preventing exceptions; he can help the child to start with great impetus; he can help to remove temptations in the early stages of fixation, and by appealing to other interests and instincts he can help to maintain ambition for success. Older children can be helped much by having the principles of habit-formation explained to them, and none of these principles is of more importance, perhaps, than that of allowing no exceptions. As soon as children are old enough for the knowledge to be of any worth to them it should be given to them. The teacher can give this information and give help in the various ways indicated to enable them to put the principles to successful use. Parents, particularly mothers, seem never to realise the significance of exceptions, for every day they can be seen to display the greatest ignorance or folly. After weeks of training in some habit a child is allowed to make a flagrant exception, thereby undoing the effect of practice. In

the formation of a habit nothing is so important as absolute regularity, and nothing so detrimental to success as exceptions. Therefore both teachers and parents should be careful in the planning of habits to be formed, but when the work is once determined upon and begun the course outlined should be pursued with the determination of a bulldog and with the regularity of planetary motion. Suppose, for the sake of an illustration, that the matter undertaken is to put a baby to bed and have it go to sleep there without any further attention. The thing is easy enough to do, but suppose that after a few weeks the mother takes the child out of its bed to fondle it; the good work is all undone, and it is usually harder to get the baby back into the old habit of quietly going to sleep than it was in the beginning. And it is not much different with older people. The very essence of habit is its regularity and definiteness, and it can not be established except by regular and definite procedure. There is nothing doubtful or mysterious about habits; they are as definite and as dependent upon known factors as are the things of the physical world. And it is just as necessary that one proceed in accordance with the principles involved in the case of habit as it is in such a matter as building a bridge. One could not build a bridge without taking account of such principles as gravitation, adhesion, friction, expansion and contraction, etc.; but if one take into account all the principles and facts involved, one can plan a bridge in every detail and be confident of the outcome of the construction. The situation is not very different in forming a habit. If one practice under the proper

conditions and allow no exceptions to occur, there is great certainty, allowing for individual differences, of what the outcome will be. We know what will be the outcome of three months of practice on the typewriter one hour each day. If the proper kind of practice prevails and the subject maintains the proper attitude and health, the outcome is certain. There will be some individual difference due to native capacity, but we could predict what the average speed and accuracy attained would be. And, more than this, the psychologist could determine by an hour's test what would be the outcome in individual cases. If we are to work intelligently in the matter of habit-formation, then, teachers and parents must know the laws involved, and as soon as it is worth while these laws must be made known to the children themselves. And along with the effects of practice comes the effect of an exception. The great importance of even a single exception is due to the effect it has upon feeling and attitude. It is not so much that the exception opens up another path of motor discharge as that it may change the attitude and feeling of the individual.

Rules for habit-formation.—In James' well known chapter on Habit he lays down some rules for guiding one in the process of habit-formation. These rules and principles are elaborated in Rowe's book on habit-formation, constituting the main part of the volume. They have already been treated in our discussion of the laws of habit, but it may be well to bring them together here in the form of rules for the guidance of the student. The rules may be stated in the form of simple commands: (1) Get initiative.

(2) Get practice. (3) Allow no exceptions. Little further need be said concerning them, for they are based upon all the facts and principles that we have been considering. By initiative we mean motive and desire. There is no use to start in to form a habit unless we can put our whole being into it. We must see a reason for the habit and really desire it; we must have a purpose, an end in view. Initiative is supplied mainly from instinct and habits already formed, as well as from the feelings. Therefore, in looking for initiative, we must call the roll of the instincts to see which are available for functioning in this capacity, then we must call the roll of the feelings. These are the native sources, the main wells from which we can draw, but we can also call upon the needs and desires that we have built up and that have a basis of habit. This initial motive power may come, then, from our fighting instinct, our social instinct, the collecting instinct, from love, sympathy, etc., as well as from the many needs that arise as a result of our previously formed habits. An illustration or two will make the point sufficiently clear. Let us take the matter of punctuality at school. Initiative might be based upon any number of instincts, emotions and habits. A child might want to come on time so that he could beat some other person's record, or so that his room might beat the record of another room,—the fighting instinct. He might want to come early in order to be with the other children; there might be a social five minutes, the first thing in the morning,—this would appeal to the social instinct. He might want to come early in order to show collections, or to do some constructive work, or

in order to see how much a plant had grown over night. Or, finally, it might be merely in response to the request of a teacher that is loved. Some of these motives will work for one child and some for another, some at one time and some at another. It is seldom that a tactful teacher can not find some way to arouse initiative. And when children are older it is seldom that they can not 'get up steam' in preparation for the formation of a habit. The factors concerned in practice have been discussed already. We have seen that practice there *must be* if there is to be a habit. To be most effective it must be when the body is in good condition, and must stop short of fatigue. For this reason the practice intervals should be short, the length of time depending upon the age of the individual. One should have stated and definite times for practice. The practice must be at the highest point of efficiency; it must be attentive practice. It may be well to give some illustrations and suggestions to show how these rules may be observed. In the matter of initiative it is well when we start in to form some important habit to tell our friends so that we may have their encouragement to strengthen our initiative and to help us to prevent exceptions. It is a good idea to identify the desired habit with some other aspect of life so that the latter is available to strengthen initiative. Identifying a habit with other important interests not only gives initiative, but serves to keep the habit in mind, and thereby leads to practice and prevents exceptions. For securing practice there are many devices, such as signs and mottoes put up about our rooms; then, also, the specifying the time and place and manner and amount of practice is helpful in securing practice and prevent-

ing exceptions. Suppose the habit desired be rising at an early hour. We must make thorough preparation in the way of initiative; we must really want to do it and have a reason for doing it. To be sure of making a good start, we can have some one call us at the desired minute, and can also have an alarm clock. We must be sure to get up exactly on time, and must allow no exceptions, especially in the early stage. Even if it is Sunday morning and it is raining, and there is no earthly use for rising at the early hour, the exception must not be made. Suppose, again, one is trying to break up the habit of smoking: one should announce it to one's friends, and should even seek frequent opportunities of being offered cigars, firmly refusing them, saying that one is no longer smoking. It is surprising what the outcome is. However, if there is any doubt about the outcome in such a case, it would be better to take an opposite course by starting in on the habit at a time when it would be impossible to get tobacco for some days. One of the most difficult things to do is to break up an automatism, an act that has gone below the conscious level. The trouble is that one performs the act before one is aware of it. The way to success is to hit upon some plan of bringing the act to consciousness. The device must depend upon the particular habit in question. A pupil of the author's once succeeded in breaking the habit of biting the lips that had existed since childhood. The plan used was to bite the lips consciously and say, "Now I must not bite my lips." By doing this for several times it came about that when she would bite the lips these verbal ideas would come to her mind and finally

enabled her to refrain from the act. A little practice and experimentation on the part of a teacher will soon reveal to him in a vivid fashion the facts and principles of habit-formation, and much better fit him for the direction of such work by his pupils.

Habits are specific.—There is no such thing as the transfer of training. A habit is a habit; it will function where it will function, and that is the end of its usefulness. It may very well be that one habit will function in a much larger sphere of life than will others; the field of usefulness of some habits may be much restricted, while that of others is large. Whether there be general habits depends upon what we mean by the term. It is the nature of a habit to be specific. That is what constitutes it a habit,—definite response to a definite situation. There is a sense, however, in which habits of honesty, truthfulness, etc., are general, but the thing that is general is the situation,—as long as the situations are measurably similar we may have the habitual response, but it usually happens that a variation in the situation fails to bring the usual response. For example, such a thing as the habit of neatness may fail to function when the pupil works under a different teacher, or perhaps in a different subject. In the strict sense, then, there can be no such thing as formal discipline or general training, but at the same time we say this, we must say that there may be habits formed in connection with certain subjects of study that will function in many more situations of life than will those that are built up in connection with other subjects. If one study an ancient language, he will form many habits that will function in the study

of at least some of the modern languages, but they might unfit one in the study of some of them. It, indeed, often happens that the training acquired in one field may unfit one for work in another field. It is the author's experience, for example, that the habits of procedure formed by a student of philosophy unfit him for the study of experimental psychology. For in the latter one must proceed by the slow inductive method of experimental science. The philosophic mind, accustomed to work things out *a priori,* is too impatient to sit down and work out facts as a basis for its conclusions. As a rule, in every profession, one finally acquires a certain way of attacking his problems, a certain mode of approach. One sees this in the lawyer, the physician, the scientist. The lawyer asks, "How have similar cases been decided?" The doctor asks, "What disease have we here? What is its effect on the individual? What drug counteracts this effect?," etc. So it turns out that whatever one's calling, one soon comes to have a definite way of meeting the usual situation that confronts him, a procedure that works under ordinary circumstances, but that may not be adequate for different situations. Habits, then, of both mental procedure and physical procedure are rather specific. The question, therefore, of the relative value of the different studies turns on what sort of habits we wish to acquire. A study of mathematics will form the habit of looking for the quantitative aspect of things. The study of natural and physical science will develop the habit of looking for the causal aspects of things. Since all must have at least something to do with both aspects

of the world, all should study mathematics as well as science. The fact that quantitative relations are nearly always important is what gives to mathematics its great value, not that it has any general disciplinary effect upon the mind. When we are concerned only with the qualitative aspects of things, mathematics is of no importance; it might even unfit us for our task. For example, it is quite possible that the mathematical habit that must balance every equation might unfit one for getting the general tendency out of a great mass of data; might unfit one for making daring generalisations that often lead to great progress in science. Of course, finally in every science mathematics must come in and have its inning. We always come around finally to ask the question, *how much?* But there are stages in the development of science when this question can not be put for the reason that it can not be answered and is not yet of as much importance as the question, *what?* In psychology, for example, we have first to ask, *what?* Our first problem is that of analysis. From the point of view of habit, therefore, the duty of the teacher is to assist the pupil in the formation of habits that will enable him to meet the various situations that will confront him in the life that he will have to lead. Inasmuch as we live in the same society, there are many habits that should be the same for all. This is our *general culture,* so called. Inasmuch as we must do different things, we must have different habits. This constitutes our special training. The carpenter and the doctor should have common habits of honesty and truthfulness, but the car-

penter must be expert at driving nails, while the doctor must be expert at making pills. The fact that training is specific can hardly be too much emphasised. In planning courses of study, while, of course, we should not lose sight of ideals and knowledge, we should work out very carefully what forms of skill the training is going to provide and whether this skill will be what the future environment will demand of the child. The school has made many of its greatest mistakes in believing, without carefully working the matter out, that it was giving training that would meet the demands of the future. The teacher worked on in the hope that he was giving a training that some day would be useful. There has been too much vagueness, too much done under the vague name of 'culture.' What we need is a careful analysis of the future needs of the child in the life that he is to live, and then a careful planning of the habits and ideals that he will need in that life. Then the developing of these ideals and the forming of these habits is the work of the school. If one wishes to know how much vagueness there is in this regard, let him ask the average Latin teacher why a student should study Latin. We need to clear our school curriculums of a lot of rubbish and plan a curriculum in the light of modern conditions and modern needs. Everything that we cannot justify should be thrown out, and this justification should be *future usefulness,* whether the matter be ideas or habits. Of course, usefulness must have a liberal interpretation, not merely a monetary one. We should have in mind the best sort of life in the best sort of society.

QUESTIONS AND TOPICS FOR FURTHER STUDY.

1. Make a list of those studies in the curriculum that are chiefly matters of idea getting, and another list of those that are chiefly matters of habit formation.
2. Show that no study is wholly either one or the other.
3. Make a complete outline for the procedure in the formation of a habit related to arithmetic or other school subject. When you, as a teacher, have the opportunity to do so, make a careful record of the results of using such a plan.
4. Compare the amount of time that should be spent in habit getting with the time that should be spent in getting ideas. Will this vary for different grades?
5. Can you give from your own experience an illustration of the principle involved in learning to swim in winter and to skate in summer? How far is this principle true and what is its application?
6. If the above principle is true, why is it that a pianist can not play as well after failure to practice for a long time? Have you any evidence showing the value of a little rest of a few days or weeks in the midst of vigorous practice in some art?
7. If there is any trick of your early days,—such as tossing up several balls at the same time,—that you have not performed for years, try it now and compare your skill after just a little practice with the skill of your early performance.
8. If knowledge is only to aid and guide in response, should we study in school branches, that which will never be of any practical use to us?
9. Try the experiment of learning some trick by practicing fifteen minutes a day while another person learns it by practicing thirty minutes a day, then try learning some other trick, reversing the length of practice periods. What do you learn from the experiment?
10. What is the disadvantage of keeping a child in a grade that is too hard or too easy for him?
11. Show how drill can be made incidental in various school branches.
12. Give from your own experience methods that secure attention and interest in drill work in the different school subjects. Note that you have to rely upon some instinct or some strong acquired interest.
13. Is it "teaching a dangerous doctrine" to say that it is difficult to form habits late in life?
14. Indicate the various aspects of a child's life that may be appealed to to get up initiative for the formation of the habit of prompt attendance at school.
15. What devices have you used to keep in mind some act that you wished to make habitual?
16. What value is there in committing to memory short sayings

and associating them to certain acts that one wishes to make habitual?

17. From the point of view of habit, what is the function of education?

18. What branches in the high school involve the formation of habits that function generally in life?

19. Name some habits that are fairly general in their applicability.

20. Give illustrations to show that, strictly speaking, all habits are narrow and specific.

21. Give from your experience illustrations to show the great harm caused by allowing exceptions to enter in the process of habit-formation.

REFERENCES.

Most of the references given at the end of the preceding chapter treat also of the relation of education to habit. See also: Rowe, *Habit Formation*, 1909, Chs. vi-xiii; P. Radestock, *Habit and Its Importance in Education*, translated by F. A. Caspari, 1886; W. F. Book, *The Rôle of the Teacher in the Most Expeditious and Economic Learning*, in *Journal of Educational Psychology*, Vol. i, p. 183; also his *Psychology of Skill*, cited in the preceding list; E. J. Swift, *Re-learning a Skillful Act*, in *Psych. Bul.*, 1907, Vol. vii, p. 17; also *Learning to Telegraph*, in *Psych. Bul.*, Vol. vii, p. 149.

On the *General Effects of Special Exercise*, see: S. H. Rowe, *Habit-Formation*, 1909, pp. 243-250; C. H. Judd, *Relation of Special Training to General Intelligence*, in *Educational Review*, Vol. xxxvi, p. 28; E. L. Thorndike and R. S. Woodworth, *The Influence of Improvement in One Mental Function Upon the Efficiency of Other Functions*, in *Psychological Review*, Vol. viii, p. 247; J. R. Angell, *Formal Discipline in the Light of the Principles of General Psychology*, in *Educational Review*, Vol. xxxvii, p. 1; Angell and Coover, *General Practice Effect of Special Exercise*, in *American Journal of Psychology*, xviii, p. 328; S. S. Colvin, *The Learning Process*, 1911, Chs. xiv, xv, xvi.

Chapter XII.

HABIT AND MORAL TRAINING.*

Importance of the problem.—No educational problem is more in need of solution just now than the problem of moral training. Teachers are asking for principles to guide them in their attempt to make good citizens out of their pupils. Parents are calling upon science for knowledge concerning the laws of mental and moral growth, and are looking to psychology in particular for information that will help them in training their children. Many people feel that the schools and colleges are not doing all that they can do for the moral development of the young people in them. And it is often said that the schools have made much greater progress in methods that lead to intellectual development than in methods of moral training. Now, there is some truth in these charges, and just in so far as there is truth in them, so far is education a failure. Education ought to give efficiency and control. Society demands of parents and the schools young people prepared to do something well, understanding the nature and relations of her fundamental institutions, knowing how to do, each his part, in the great whole; and, most important of all, *trained to do* that part. The parents and schools have charge of the individual for about one-fourth of his life. Surely, then, society has the

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right to demand that the individual be given sufficient training to prepare for reliable action in all the complex relations of life.

Futility of recent discussions.—Recent discussions of the problem of moral training give little help to either parent or teacher. This is largely because the question has been approached from the wrong point of view. For the most part, the writers on this subject concern themselves with religious, ethical and sociological discussions and speculations. Now, the question is not a matter of religion, and all that ethics and sociology can do is to establish the goal, set up the end, to be attained by moral training. But on this point there is already general agreement. Teachers know the kind of citizen that is desired. Every father knows what sort of man he would have his son become. What is wanted by both parents and teachers is *information concerning the laws of mental development, and methods of training planned in harmony with these laws,*—methods that will lead to certain, definite, desirable action.

Moral training and psychology.—The laws of mental development and methods of training planned in accordance with these laws are problems for psychology. It is to psychology that we must look for the help that everybody desires. What, then, has psychology to say? Before attempting an answer, it may be well to state a little more fully the aim of moral training. The question, of course, is: what shall be our criterion for morality? In a general way, we may say that a person has a good moral character who responds to all the various situations of life in a way conducive to the welfare of himself and soci-

ety. Reduced to its simplest terms, this means *appropriate response to stimuli,* a proper co-ordination of action and perception. What this appropriate response, this proper co-ordination, is, society always has the right to say, and it says different things at different times. The moral ideal is a growth, is an evolution, just as all other educational ideals are; there is nothing absolute about it. The moral ideal is the conception that society has reached of the action of its members that will best lead to the good of the whole. This conception changes, but in any generation it must be taken as the guide for the moral training of the young. There is nothing mysterious or mythological in the matter. Society demands—and has the right to demand—that its members be so trained that they will, as the occasion arises, immediately and regularly respond in a way beneficial to the general welfare. Given situations demand definite types of action, definite responses. Considering the situation as the stimulus, we may say that the essence of moral training consists in *co-ordinating with stimuli their appropriate responses.* The problem for psychology is to work out the laws of mental development, and, in the light of these laws, prescribe methods for the training of the young, to the end that they may reach the standard set up by society.

Psychology is not able at present to give a complete solution to the problem, but it is able at least to indicate the nature of the solution. All that we have said in discussing instincts and habits applies to moral training in just the same way as it applies to other training. For psychology, moral training is

the same sort of problem as that of training in general. It falls under the psychology of action. A person of good moral character is one who *habitually* does the right thing at the right time. Now, the nature of habitual action is that it is more or less reflex. Moral training, then, must seek to establish reflex responses to the various situations of life. One of the principles of action is that the more often a certain movement follows upon a given stimulus, the more certainly and easily will it follow with each succeeding presentation of that stimulus. This is the nature of the problem of moral training as psychology sees it, and this, in outline, is the nature of the solution offered.

Must be based on definite principles.—Methods of moral training must be based on established principles. These principles are, as we have already said, the laws of development. The child is the product of evolution, of ages of development, the result of long conflict with the forces of nature—with wind and storm, seas and mountains, burning heat and great continent-wide glaciers, with earthquakes and all manner of catastrophes. There has been also the conflict with the forms of life from the microscopic bacteria to the huge brutes of the forest and jungle. And, too, there has been the struggle of man with man, the conflict of muscle and of wit. As the heritage of it all, we have the child of today. "The soul is thus the product of heredity. As such, it has been hammered, moulded, shocked and worked by the stern law of labor and suffering into its present crude form. It is covered with scars and wounds not yet healed. It is still in the rough and patchworky, full

of contradictions, although the most marvelous of all the products of nature." If we are to know how to train the child aright, we must know something of all this history and the kind of child finally bequeathed to the present.

The child is born with a few co-ordinations of response to stimulus ready formed. As it grows older, many other inherited responses come into play. The child can not escape its ancestry. The hand of the past is upon it. And here our work begins. These inherited responses are our starting point. The first task of psychology, in the matter of moral training, is to establish the order and time of appearance of instincts, their relation to one another and to the environment. This we have endeavored to do in the earlier chapters. The principles of the inhibition of movement and the laws governing the formation of habits, also outlined in preceding chapters, are of great service here.

The instincts and moral training.—One of the important instincts available for moral training is imitation. When about one year of age the child tries to imitate everything it sees. The child does as it sees others do. It responds to situations as it sees others responding. If parents and companions swear when they strike their fingers instead of the nail, so does the child. If they, on certain occasions, respond with angry word or look, so does the child. The child's companions become its models for action. Therefore imitation, as the world long has known, is one of the most important factors available for moral training, as for all other forms of training.

Not only must all the instincts be taken into ac-

count, but the whole nature of the developing child. The child should lead a natural, healthy life. He should be hammered and moulded by his environment much as his ancestors have been. To this end he should have provided a rich and varied environment. And really all that teachers and parents can do for him is to manipulate this environment. The child is to be taught as far as possible in nature's way. The child should know much of the natural environment: hill and valley, wood and stream, animal and plant, fishing, hunting, swimming and all sorts of out-door experiences and activities. The relations with companions should be many, varied and intimate. The child should learn, by experience, the natural consequence of action. The environment should be manipulated to this end, and only sufficiently to contribute to this end and to the formation of healthy habits of response. The manipulation of the environment must, then, have in view two things: 1. The child is to live a life rich in experience, many sided, full and complete; 2. The child should always suffer the consequences of his action, in terms of pain and pleasure, deprivation and reward, loss of freedom and liberty. The child must find on every hand invariability and absolute regularity. A lawful environment means a lawful child. A lawful environment, however, is not one of punishment and harshness only. A large part of this environment should be love and sympathy, for the child is a creature of feeling and emotion as well as of will and action. Feeling and action are always most intimately associated, and it is quite as important to see that appropriate response reaps its reward in pleasure as to see that

inappropriate response reaps its reward in pain. The close relation to nature is to be fostered in order to develop a healthy, natural animal as the basis of moral action. No actions are intrinsically bad; they should be judged by their results. Children, in their relations with one another, should learn the natural consequence of action, the natural results of given forms of conduct, and be allowed, as far as possible, to suffer this natural consequence, so that this result, this consequence, can have its due influence in determining the next action in the same situation, and so finally lead to the formation of the most desirable co-ordination of response and stimulus. If one picture to oneself the way in which conduct was determined among primitive men, one will get some notion of the way in which conduct should still be determined. Doubtless the hard knocks of primitive man in the fierce conflict with nature and with his fellows led to a very definite sort of response. The child's environment today should be allowed to work out a response no less definite. Every instinct is to be taken account of, some use can be made of every one of them. Even fear has its place, and in the natural course of events will help in bringing about the desired co-ordination. Account must be taken of the instinct of play. In the early years of the child's life it will be of great service in revealing the nature of the world to the child and in securing for him a rich experience, which, as we have said above, is of so much importance. In later childhood and youth it will be of inestimable value in teaching the child how to live in the social organism, teaching him his place and the rights of his fellows.

Ideals of action.—Another principle available for moral training is the tendency for action to follow upon an idea. The idea of an action that has been performed will be followed by similar action unless an inhibiting idea arises. In the presence of a given situation the child will have an idea of an action that he has performed or has seen others perform under the same circumstances. The idea of the action is followed by the action. This is the beginning of the formation of a reflex response. With continued repetition of situation and response, the perception of the stimulus is followed by the response. It is this fact alone that gives any value to moral teaching, to developing ideals of action. The psychological principle involved is this: a child can be taught that a certain type of situation should give rise to a certain type of action. As a mere matter of memory, when such a situation arises, the individual remembers what sort of action is appropriate; the idea of the action goes over into the action itself. What we should say is that it *may do it;* the idea goes over to the act, provided there is no inhibiting idea. It is just the fact that there are practically *always* inhibiting ideas that makes formal moral teaching of so little value. A child could be taught in a few hours the proper sort of actions for a whole lifetime. But afterward the child must have practice in following the *idea* up by the *act,* so that inhibiting ideas will not be able to interfere in the future. In fact, what holds with all other forms of training holds here with even greater force. It does not take long to learn the principles involved in any trade or art, but it takes a lot of practice to make one worth anything

in their practice. So it does not take long to learn all the moral principles, but it takes a good deal of practice before the response and stimulus are very definitely connected.

Inhibition.—The principle of inhibition is important. The first responses to a situation may lead to pain, and in the future the situation may call up the idea of the pain, and this idea of the pain serve to inhibit the sort of response given formerly, and a habit of action eventually be formed quite different from the first response. Much depends on first experiences. Almost any sort of response can be acquired for any situation. To draw an illustration from the instinct of fear, a child's reaction to the presence of a certain animal, say a dog, is determined by his first experience with that animal, and it may take a long time for different experiences to vary that type of response. All of the child's responses are subject to the same fortuitous determination. A little carelessness on the part of parents relative to the early experience of children is apt to lead to the formation of habits of response that will require a world of trouble and patience to undo later. As a rule, no habituated response should be formed that must be radically undone later.

Repetition and moral training.—Repetition underlies habit, and habit is the basis of character. The continued repetition of the same response to the same stimulus fixes the co-ordination, makes it more and more certain and inevitable. It is this principle that makes any kind of training possible. During the period of plasticity of the psychophysical organism it is relatively easy to establish almost any sort

of co-ordination. Without this principle of definiteness of co-ordination as the result of repetition the formation of character would be impossible, for fixity would be impossible, and one could never know how any individual would act in any circumstance. We are, then, to take advantage of our knowledge of the nature of the child and of our power to manipulate the child's environment in securing the repetition of the desired responses and, as a result of the repetition, the formation of definite types of action.

In securing this necessary repetition parents and teachers must be the constant associates of the child, leading it through all the various environments and situations. The child gets the cue to his action from them and by repetition comes to do it naturally and as a matter of course. Pain, as the natural outcome of the violation of law, personal or social, is to aid in securing the appropriate response. The *right response* is the important thing, and must be secured by any and all means, sometimes even against the will of the child, and compelled by force if necessary. The appropriate response must be *secured and continued* until it follows as a matter of course. It must be pointed out that such a procedure necessitates that parents be the constant companions of their children. This they can not be if the father is entirely engrossed with his business and the mother with teas and clubs. Some day we shall learn that the most important business of parents is the education and training of their children, through constant companionship, help and sympathy.

The school and the home in moral training.—And when the teacher undertakes a part of the work of

training the child he must proceed in accordance with the same principles. But too much has been turned over to the schools, too much is expected of them. The home is the natural place for education, but the home has turned over, one after another, almost all of its responsibilities to the schools, and now parents censure the schools for not doing well the things that they themselves have shirked. The child has little business in school before the age of eight, and it is in the first eight years of its life that the foundations of moral training must be laid. If all is well done in these first eight years, there is little to do later,—little except to keep the environment favorable for the development of the moral character, whose basis is already laid. The center of gravity of education must be shifted back to the home where it belongs, and parents must assume again the greater part of the responsibility for the moral training of their children. For this responsibility the parents must be trained. This business of rearing children should be in large measure the function of the mother, and for this great duty she should be especially prepared. Women are crying for the ballot, for admission into all sorts of occupations and professions where they are not fitted by nature to be. Here is a work that would serve as an avenue for the expenditure of all their energy and ingenuity, a work than which there is no greater, to which they are by nature especially adapted. The whole education of women and all her professional training should be directed toward this end. This training and preparation should include a knowledge of physiology, hygiene and dietetic principles, nursing and the cure and prevention of dis-

ease, plumbing and everything connected with the sanitation of the home, genetic psychology and neurology, and everything that a scientific pedagogy can teach concerning the education of children, everything that art can teach her that will enable her to beautify the home. All this is for her professional training. For her cultural development she should have the same education as man. If woman will take over and solve this problem of the training and nurture of children, she will be doing her full share of labor for society, and should be relieved of her work as shop girl and typewriter. The schools can help in the work of moral training and have their share of the work to do, but the greater burden falls to the home, and will never be well done until it is well done there.

Practical moral training. — Moral training is to begin with the birth of the child. It should begin with regularity in feeding, in exercise and in excretion. The child should early learn that this is a world of law and order. The lesson of absolute and implicit obedience should be learned early and learned well; then other training comes more easily. As fast as the child meets the various situations of life and is capable of responding to them, it should be led to make the correct response. Training can come early in such matters as personal hygiene, relation to other children and older people, polite behavior at the table and even in the general conduct of their lives. In all these matters the child should and can be taught to give immediately the proper response as the various occasions arise. These responses can, by adequate repetition, be made certain

and definite. To illustrate: A friend arrives, the child's hand extends in greeting; food is passed to the child; it responds with, "I thank you;" the child by accident steps on its neighbor's toes and responds with, "I beg your pardon;" the child gets some candy and puts away a piece "to save for papa;" a playmate has an accident and is in pain; the child responds with such aid and sympathy as it knows how to give. In all the various situations of life that confront the child it is to be led by parents and teachers to make the proper response. By invariable repetition these responses are to be reduced to the realm of habit, and are to fall largely under the control of the lower nerve centers.

Most of the situations of childhood are simple, but the principle applies in the more complex relations of later life. Do we not know pretty well how our friends will act on any given occasion and in any situation? To a considerable extent we do, and this is possible only because these friends have been responding in a definite way to such situations all their lives, and it is not possible for them to act otherwise than as they do. It is this definite kind of response, in fact, that constitutes the chief difference between one man and another. Every individual establishes for himself certain forms of response; these become more and more automatic and mechanical; they come to be a part of the man; they are to be taken account of in our dealings with him, for they *are* the man. Now, if an individual is a "bundle of habits," if every one sooner or later acquires pretty definite modes of response to all the situations of life, the question of moral training becomes a very simple one

in theory, however hard it may be to carry it out in practice. All that is required is to bring about on the part of the child the appropriate response, to lead to the formation of such a bundle of habits as will be most conducive to the welfare of the child and society. Moral training, as stated above, turns out to be of the same nature as training in general. Education as a whole becomes the formation of a "hierarchy of habits." We teach a child to say for two plus two, "four;" for three plus two, "five;" for two times four, "eight," and so on. We also teach him to observe closely, think accurately and speak correctly as matters of habit. In music, one learns when one sees a note on a certain part of the scale to strike a certain key on the piano, or to produce a certain tone with the voice. Similarly all training is a matter of bringing about on the part of the one trained *definite, habitual responses* for definite conditions and situations.

It may be said that in reaching this conclusion we have made little progress, for the important thing is the *method of forming these habitual responses.* But surely it is worth while knowing just what our problem is. We can never solve it till we are sure of its nature. Once we are agreed that the essential of moral training is habitual response, more or less automatic, we shall be far on our way to the solution of the question of method. We have indicated above the nature of this solution. When our knowledge of the child is more complete, when we can trace better the order of development, we shall be able to prescribe pretty definitely the method of moral training.

As our knowledge now stands, we can outline the

essential features of the method, as indicated in the preceding paragraphs. It is also worth while knowing that nothing new is to be expected. There is nothing new, strange or mythical that a commission or committee of investigation will be able to discover. The fundamental principles of moral training have been known as long as we have known anything. Neither parents nor teachers need expect the discovery of some new moral antiseptic, some new pink pill that can be administered three times a day before meals, and that will transform the children into little angels of conduct, thereby giving the parents relief from care and anxiety. Nothing will ever take the place of constant work and watchfulness on the part of parents. They should realise that nothing can take the place of a careful study of the principles involved, a full comprehension of the task, and daily and hourly watchfulness and care in carrying out these principles.

The emotions, actions and character.—The moral training which we have in mind includes a proper control of the emotions, the development of endurance, bravery, sympathy, patience and self-control. All these characteristics are to be acquired as definite responses to definite situations. We want a race of men for whom crime will be impossible, not because of a moral precept that has been learned, but because they have never committed crime and it is not in accord with their nature. It is important that early training make the individual a person of prompt action as soon as the nature of the situation is perceived. It is only to such a person that ideals and forms of action can be of any value. Whatever good

may come in later youth from the principles of moral action depends entirely on the previous formation of reflex responses. The tendency of the schools has been to separate knowing and doing, while the only reason that we need to know anything is that we may do something. One of the reasons that the schools have been doing so poorly in moral training is because they have omitted activities from the course of study. Doubtless the failure of parents is in part due to the same cause. A generation ago most homes furnished plenty of activities to serve as a training school for the children.

Objections considered.—Several objections might be raised against such a training as we have briefly outlined. It might be said that it would lead to action without principle, without motive, that the child would have no standards or forms of action. To this it may be replied that it is right action and not a knowledge of principles that is primarily desired. We want men for whom stealing, lying, cruelty, drunkenness, unkindness shall be impossible, just as we want bad language and loose thinking to be impossible for them, not because of the knowledge of principles of grammar and logic, but because they have always spoken correctly and thought clearly. The drunkard knows that it is wrong to get drunk, the thief knows that it is wrong to steal, the liar knows that he ought not to lie. The ragged tramp as he plods his way along the highway or railroad may have lofty ideals and visions fair, but these ideals and visions are never realised. The thing primarily desired is such a correlation of response and stimulus as will make crime impossible, a condition

that will make the ideal an effective stimulus to action that leads toward realisation. The only way to have such a condition is to make right and appropriate action habitual to men. Many mothers tremble in fear lest their sons go into saloons and become drunkards. It ought to be as easy to train a boy not to go into saloons and other places of immorality as it is for the hunter to train his bird dog not to chase rabbits. Many parents could learn much from dog-trainers. The physiological and psychological principles of action are the same for man and beast. We do not mean to say that general principles and rules of action are not important, but they are secondary, not primary. They will follow naturally upon a course of training that makes the formation of habit the basis. As the child grows older and remembers and reasons, he comes to generalise on his actions and their results. These memories and generalisations enter into future conditions and situations, and become part of the motive, part of the stimulus to action.

It might also be objected that it is impossible to train an individual so thoroughly that he will be prepared for all the varied and complex situations of later life. But this objection will not hold. If parents and teachers have had the right relation to the child till maturity is reached, adjustments of response to situation will be formed in about all the normal situations of life. Moreover, if a novel situation should arise in later life, the individual is then a person of memory and reason, as was pointed out above; the situation is immediately compared with past situations; it becomes a stimulus like such-and-

such-a-one; the appropriate response appears immediately, provided there is a sufficient *habit*-basis back of it.

It might be further objected that it is not desirable to reduce conduct to the realm of habit; that we should seek, on the contrary, to preserve plasticity. The obvious reply is that in the matter of character the less plasticity, the better for society. The trouble with us now is that we are too plastic. We steal one day and lie the next. Where there is plasticity in moral character there is chaos in society. What we need morally is *fixity*. There should be no place for plasticity when it comes to matters of crime and sin. If we desire that good action should become natural to men, we must make it first a matter of habit, a matter of reflex response.

QUESTIONS AND TOPICS FOR FURTHER STUDY.

1. Keep a record of your moral acts for a week, indicating those that you think right and those you consider wrong. Why are they right? Why wrong? Why did you do the right acts? Why the wrong acts?
2. Make a list of the ten best men that you know and a list of the ten worst men you know. What is the basis of your classification? Do the bad men in your list know what is right as well as do the good men?
3. Enumerate the differences between the typical good man and the typical bad man of your above lists. How many of these differences are there? How long would it take to teach the moral principles involved,—teach them as mere facts?
4. Make a list of the moral principles that *you* think an ideal man should follow. How few principles will they reduce to, and how long would it take to teach them thoroughly to a child?
5. Do not such considerations as the above make it plain that although the teaching of moral principles may be important, it is insignificant in comparison with the importance of habituation?
6. Is not a person who knows what good conduct is, but has not been trained to do it as a matter of habit, very much like a person who knows how to add and subtract, multiply and divide, but can not solve a single problem without making mistakes because he has not habituated the processes?

7. Give from your experience illustrations showing the importance of regularity and uniformity in forming a moral habit.

8. Try to observe the training of children in their homes; report the procedure of parents that seem to understand the laws of habit formation and of some who do not.

9. Give from experience or observation instances of the violation by teachers of the laws of habit formation as applied to morals.

10. Can you prove that mere knowledge of the right is not sufficient basis for moral action?

11. Do you think we need to worry about a man's ideals if he always does the right as a result of habituation?

12. Sometimes the children of preachers go wrong,—children that have been preached to and prayed for daily for twenty years. If you know of any such case, can you explain it?

13. What can the school do for a boy fourteen years old, normal mentally and physically, but who has had no moral training, and as a result lies, steals, etc.? If you have ever observed such a case, describe the treatment and the results.

14. Show that in the very same family the children may have the same knowledge of right and wrong, but that some are very much better than others so far as actions are concerned. Why is this?

15. A few years ago the author went to a town to give a lecture to a body of teachers. The next morning he found the people excited and threatening mob violence. A prominent minister of the town had been put into jail because of a serious crime. The man knew the right, for he had been teaching it to his flock. Why did he not do the right?

16. From your own experience, can you say that the careful study of mathematics or science will have anything to do with one's moral actions?

17. When you have the opportunity as a teacher, try to find evidence of the moral effects of school studies. Try to discover the moral effects of the study of literature or history. Is such effect a myth or a fact? Does the manner of teaching have anything to do with it?

18. Has any teacher ever had a great moral influence upon your life? If so, describe the matter in detail, giving your age and the exact nature of the moral influence.

19. Carefully consider the moral influence of your father and mother upon your life. Work it out definitely, considering methods and results.

20. Have you ever observed in your own life or the lives of others any definite moral influence from nature study?

21. Is it possible to do very much in the high school in the way of moral training unless it is based on admiration for, and imitation of, a strong, forceful, upright teacher? Without such a teacher, would the formal study of ethics have much more value than a microscopic study of earthworms?

22. Discuss the relation of religious belief to moral practice.

23. How can parents be made to see that the main work of moral training must fall upon them? And how is it possible for the modern home to do its proper work in this regard?

24. Suppose you are a mathematics teacher in a city high school. What can you do in the way of moral training? Answer from experience, if possible.

25. Have you ever known of a case in which a home has been revolutionised morally through the influence of the school? If so, report in full.

26. Do you think religion necessary in moral training? Give the evidence to support the position that you take.

27. If a systematic course in history and mathematics is necessary, why is not a systematic course in ethics necessary?

28. Work out fully the moral influence that may come from the group games of youth.

29. Do you believe that the personal relations of teacher and pupils are more important for moral training than formal teaching of ethics?

30. What plan of building up a moral character was successfully followed by Benjamin Franklin? Does this give us any idea as to the proper kind of moral training?

REFERENCES.

F. Adler, *Moral Instruction of Children*, 1892; G. A. Coe, *Education in Religion and Morals*, 1904; G. E. Dawson, *The Child and His Religion*, 1909; C. DeGarmo, *Ethical Training in the Public Schools*, in *American Academy of Political and Social Science*, No. 49; *Principles of Secondary Education*, Vol. iii, *Ethical Training*, 1911; J. Dewey, *Moral Principles in Education*, 1909; *Teaching Ethics in the High School*, in *Educational Review*, Vol. vi, p. 313; E. O. Sisson, *The Essentials of Character*, 1910; E. E. Kellogg, *Studies in Character Building*, 1905; H. T. Mark, *The Teacher and the Child;* M. E. Sadler, *Moral Instruction and Training in School*, 1908; E. P. St. John, *Stories and Story-Telling in Moral and Religious Education*, 1910; H. Spencer, *Education, Intellectual, Moral and Physical*, 1894, still worth reading; D. S. Jordan, *Nature Study and Moral Culture*, N. E. A., 1896, p. 130; G. Stanley Hall, *The Moral and Religious Training of Children and Adolescents*, in *Ped. Sem.*, Vol. i, p. 196; *Moral Education and Will Training*, in *Ped. Sem.*, Vol. ii, p. 72; G. E. Dawson, *A Study in Youthful Degeneracy*, in *Ped. Sem.*, Vol. iv, p. 221; Mrs. F. Schoff, *The Home as the Basis of Civic, Social and Moral Uplift*, in *Ped Sem.*, Vol. xvi, p. 473; D. Mussey, *The Ideals of Ethical Culture for Children*, in *Ped. Sem.*, Vol. xvi, p. 513; G. E. Meyers, *Moral Training in the School*, in *Ped Sem.*, Vol. xiii, p. 409; J. F. Rogers, *Physical and*

Moral Training, in *Ped. Sem.*, Vol. xvi, p. 301; L. W. Kline, *A Study in Juvenile Ethics*, in *Ped. Sem.*, Vol. x, p. 239; L. D. Arnett, *Origin and Development of Home and Love of Home*, in *Ped. Sem.*, Vol. ix, p. 324; E. J. Swift, *Mind in the Making*, 1908, Ch. ii; M. V. O'Shea, *Social Development and Education*, 1909, pp. 265-272; H. Münsterberg, *Psychology and the Teacher*, 1909, Chs. xx and xxiv; E. A. Kirkpatrick, *Fundamentals of Child Study*, Ch. xi; E. F. Young, *Ethics in the School*, 1902; E. H. Griggs, *Moral Education*, 1904; E. A. Sharpe, *Foundation Stones of Success*, 1910, in three large volumes, containing abundant material for use in developing moral ideals.

Chapter XIII.

MEMORY.

Meaning of memory.—Experiment seems to reveal two kinds of images: (1) One that has an associative setting, which gives a feeling of familiarity with it, and (2) an image without any associative setting, and therefore lacking any accompanying feeling of familiarity. The former is called a memory image, the latter an image of imagination. The term *memory* is used not only to designate this particular kind of image as distinct from the image of imagination, but is also used in the same sense as the term *retention*. When we speak of the accuracy or fidelity of memory we mean that the image or idea represents accurately the original impression. If our memory is accurate, our idea of a past experience agrees accurately with that experience. On the other hand, when we speak of a good memory or poor memory we have reference rather to the retention; we mean that retention is good or retention is poor. If today we can not recall any of the experiences of yesterday, then we say that our memory is poor, meaning that the impressions are not retained. In general, then, we shall use the term as the name of a kind of image and also as synonymous with the fact of retention of images or ideas. In the former sense it is the name of a definite kind of complex mental process; in the latter it is the name of a physical or psychophysical fact. For what is retained is doubt-

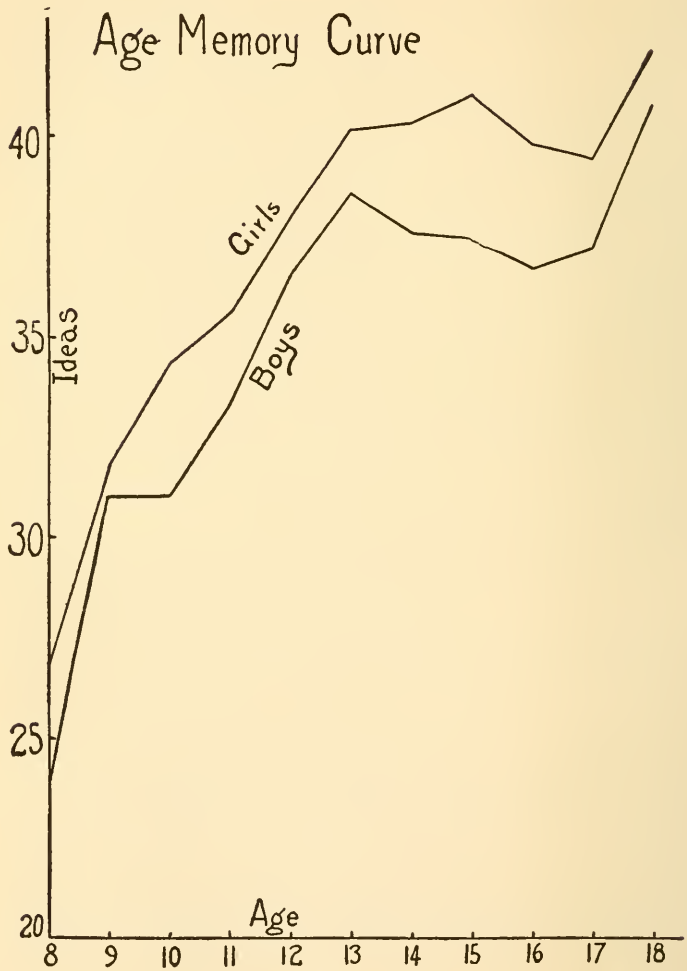
less some modification of the nervous system, which is the basis of the brain process underlying the memory image.

Experimental studies.—Experimental studies of memory have been in progress for twenty-five years, and the main facts are fairly well determined and our knowledge of the various aspects and conditions of memory is tolerably accurate and complete. The divergent conclusions reached in certain fields are due, in the main, to differences in methods and conditions of experimentation. The main problem of experimental work has been the determination of the relation of memory to age, sex, intelligence, form and manner of presenting the material, ideational type, rapidity of learning, kind of material, and number of repetitions. Other problems have been the question of improvement of the memory, the conditions of good memory, the most economical methods of learning, and the function of the teacher in the process of memorising. We shall proceed to set forth the results of the experimental work in the various fields and indicate the significance of these results for education.

Relation of memory to age and sex.—It is the popular opinion that the memory of childhood is superior to that of any later period of life, but this seems not to be the case, for memory improves up to adolescence and possibly to maturity. The immediate memory span for digits improves from *five* in the early school years to *seven* in the later school years. Nor does memory decline later. The memory of adults remains as good as at any earlier period of life, at least till general mental decline sets in, al-

though there are no experimental studies of the memory of old age. This improvement with age, however, turns out to be more a matter of immediate memory than of permanent retention. Some studies show that the child retains about as much relatively of what he learns as does the adult, but he can not grasp as much, can not learn as much, and this may be due to the fact that experience, increased knowledge, enhances the ability to learn. There is some evidence that memory, or at least some aspects of memory, reaches its greatest efficiency at about the beginning of adolescence. It seems, for example, that poetry can be committed to memory by pupils of this age better than at any other time. This may be connected with the fact of universal interest in poetry at this age, which prompts so many boys and girls to write poetry at this time.

Most experimental studies of memory that have taken account of differences due to sex have found that the memory of girls was better than that of boys, although it is somewhat dependent upon the nature of the material memorised, boys sometimes excelling in rote memory for names of concrete things and for real objects. Girls also excel in logical memory. In tests of public school children conducted by the author it was found that the girls excelled in logical memory at every age from nine to fifteen with the single exception of the age eleven, when the boys and girls made practically the same record. That the memory of girls should be rather uniformly better than that of boys is a curious and interesting fact that awaits explanation.



The improvement of logical memory with age is shown by the rise of the curves. The material used for the test was *The Marble Statue*,—Whipple's *Manual*, p. 347. About 300 children of each age were tested.

Improvement of memory by practice.—Some psychologists have held that our native brute retention, being mechanical in nature and having its basis in the nervous system, can not therefore be altered by anything we can do. It may be true that the ultimate physiological basis of memory can not be improved by practice, but practice certainly improves the immediate memory both for nonsense and meaningful material. But here, again, it may be more a matter of increased ability to learn than increased ability to retain. However, the relative retention is improved just as much as the learning capacity is increased. But there is some correlation between learning and retaining, and, on the whole, the experimental work rather favors the idea that there is at least a slight improvement of retention with practice. In some extended experiments conducted by the author, subjects actually retained a larger percentage of what was learned after practice of three months. The ability to learn was increased in this time about four times. We can not, of course, be sure that in the latter case the matter was not learned better than in the former. It amounts to the same thing in the end whatever be the actual function improved. The simple fact is that by practice one can greatly improve his ability to get and hold facts; for example, in the experiment mentioned above, a student by daily practice, in three months time, was able to learn in fifteen minutes the ideas contained in about 250 words of thought material. This task before practice required an hour, and the facts were retained better in the fast learning than in the slow, in the ratio of 9 to 8.

The conditions affecting retention.—What hereditary factors cause the native individual differences in memory capacity we do not know, but, apart from the fact of individual differences, the factors influencing memory are, (1) the character of the initial impression, (2) the number of attentive repetitions, and (3) the nature and number of associations.

The first impression.—The nature of an impression can vary in many ways, but its clearness and affective values are most important for memory. The impression that is clear and vivid and that has a great pleasure or pain accompaniment is best remembered. An individual is most deeply impressed by those things and processes that touch vital interests, that are significant for the life of the individual. The teacher can therefore save much time usually spent in repetitions by making the conditions of first presentation as good as possible. To this end, the child must be prepared for the material and the material for the child. The child must have had sufficient experience to understand and appreciate the new ideas; moreover, the situation should usually be such that he really demands the new material,—needs it and is eager for it. And, on the other hand, the material, the new ideas, must be naturally and logically presented with due regard to concreteness, to explanation and elaboration. If not understood, the new idea can make little impression, and will therefore be poorly retained.

The number of repetitions.—The value of repetition for memory is much the same as for habituation. Liability to recall doubtless has the same neural basis as has the relation of response to stimulus in

habit. Repeating an experience, thinking our thought over again, fixes the neural conditions on which retention and recall depend. Experiments show that, within limits, the greater the number of attentive repetitions, the better the retention. If, for example, a series of nonsense syllables is learned on one day, they can be re-learned on the next day with a saving of one-third of the time, and if they are repeated twice as many times on the first day as are necessary for a perfect reproduction, then there is a saving of two-thirds of the learning time on the following day. But the repetitions are not all of equal value for retention. The first few repetitions, and particularly the first *one,* for most people prove of more value than succeeding repetitions. The degree of attention is probably the most important factor here; if a high degree of attention can be maintained, then the repetitions doubtless will have a higher value for retention, at least till fatigue begins to interfere. Repetition at any time is of little value in fixing an impression, unless the process is in a high degree of attention. The same rule, in fact, applies to repeated impressions that applies to the first impression, and the fact that after the first impression the thing is no longer new and has lost some of its freshness may account for the decreasing influence of the later presentations. And it is this loss of interest after the newness has worn off a process that presents the chief problem in drill work. How can the same material be presented again so as to have the value of an initial impression? The problem is easier here than it is in the case of habituation, for there is greater possibility of variation. Ideas can be re-presented

under all sorts of new conditions and combinations and from different points of view. They can enter into a generalisation, a deduction, an application. Such repetition becomes quite as valuable sometimes as the first presentation.

The value of associations.—If one learns a series of nonsense syllables and a verse of poetry, the latter is much better retained, because of the fact that it has meaning. That anything has meaning is a matter of association, of past experience. The nonsense syllables are associated together in a series, but there is nothing else to help hold them, whereas the words in the verse of poetry revive abundant associations apart from the fact that one word follows another in the lines. These old associations lay hold of and re-enforce the words in memory. A verse of poetry first presented is not something really new in the same sense that the nonsense syllables are new to experience. In fact, there is very little, if anything, in the verse of poetry that is new to experience. If there is, and especially if there is very much that is new, then it approaches the nonsense syllables in difficulty of memorising. The richer in association an idea is, the better it is retained and the greater is its liability of recall. The proper sort of repetition, of review, of organisation, serves to increase and to fix these associations. These factors are all much affected by the individual's physical condition. In fact, every aspect of learning and memory is delicately dependent upon the physical state of the subject. The effects of illness and fatigue become immediately evident in decreased capacity to learn and remember.

Economical learning.—(1) *Commiting to memory.* It has been proved by experiment that the most economical way to commit to memory, say a poem, is to read the poem through from beginning to end, as a whole, and to continue to re-read it through in the same way till it is completely learned. It is not economical to divide the poem up into little units and learn these separately. And this is true whatever the length of the poem, at least up to one 240 lines in length,—the longest unit yet studied. Two of the most important factors in making this procedure the most economical are: (a) There is no time lost in cementing together the different parts and unlearning the associations of the last line of a unit with the first line of that unit, as fixed by repeating the part separately, and (b) when the poem is read through as a whole, some parts of the whole all along are learned from the beginning and their fixation sets in from the start. In the case of a long poem that must be learned by several sittings there is much sub-conscious fixing that goes on between times, and if the poem is read through, this affects equally the whole poem. This principle applies only to verbatim learning, and we are not, perhaps, justified in making any inferences concerning the learning of ideas apart from verbal learning. This point must be settled by direct experimentation. We do have some knowledge, however, of the most economical distribution of time in committing to memory that will perhaps apply to the learning of ideas. If we have to learn something too long to commit to memory at one sitting, say 60 lines of poetry, the best procedure is to read it through twice at one sitting and repeat daily

till the matter is learned. Of course, if one is to learn a thing, and must learn it as soon as possible, he can not consider the most economical distribution of time, and must therefore learn it even though at a great loss of time as compared to the most economical procedure. Another element also enters in in favor of the short unit. In a short unit one can learn perfectly a short stanza in a little time, while if the whole poem is read through it is some time before any of it can be repeated, and the learner seems to be making no progress, and a person, particularly a child, prefers to work in such a way that immediate results can be seen, and telling him to read on and by and by he will know the poem is very much like telling him to work on and by and by he may be President. Remote ends do not appeal to a child. A few demonstrations of the best procedure might, however, make even the child willing to work by the most economical method.

(2) *The best memory material.* Memory for objects is much better than memory for words, and for most people memory for concrete words is much better than for abstract words, memory for meaningful words is better than for nonsense or meaningless words. The most effective teaching, therefore, keeps near to the concrete reality. We should study the actual object when possible. When this is not possible, then the best possible representation of the object. Abundant demonstration and illustration are a part of all good teaching. And it is always a saving of time to spend it helping pupils to get clear, definite and accurate conceptions of reality. By do-

ing this we save much time that we should otherwise have to spend in repetitions.

(3) *Cramming.* As already pointed out, there seems to be at least a slight positive correlation between quick learning and good retention. Experiment settles, at any rate, that the contrary opinion, namely, that the slow learner retains the best, is not by any means a universal truth. The quick learner must necessarily possess the factors that make for good retention. He works under favorable conditions of attention and interest that are also factors of good retention. It must be that the impressions are deeper and the associations better for the quick learner. This favors retention. The fast learner gets his subject matter more as a unity, more as one piece,—he sees it whole, while the slow learner has forgotten the beginning before he has spelled his way to the end. Such, at any rate, is our interpretation of the experimental fact that the fast learner not only retains absolutely more than does the slow learner, but, at least in some cases, *relatively* more than does the slow learner. Experiment is confirmed by the general observation that he who can read a book at the highest rate of speed gets most out of the book. This need not mean that the fast reader profits most by the reading of the book. If the cause of the slow reading be to ponder over the matter and think it out more clearly in all its consequences, then, of course, the slow reading is more profitable; but this is another matter.

What, then, about cramming? Professor Titchener is right in saying that there are two forms of cramming,—good and bad. There are at least two

forms of cramming that are legitimate: (1) At the end of a course of study, after a student has carefully worked out all the details of the course separately, a rapid survey of these parts as making a whole is of great benefit. It cements the parts together and gives them a higher meaning. Such a review is valuable both as a form of repetition and in giving really new associations. The facts are seen in perspective, and therefore are seen in their proper proportion and importance. But in saying this we assume that the facts have been carefully learned. The student who neglects his work during term-time and hopes to make up by a few hours of concentrated effort at the end can not hope to stand with the person who has been learning and organising the matter throughout the term, and especially is this true if the latter also makes use of a final organisation or review. A careful re-survey of a course at its end is often of as much worth as any other equal amount of time spent on the course. (2) Cramming is also a legitimate procedure in the organisation of a mass of subject matter for a particular occasion after which there will be no need for its use. One such occasion that a student meets is the passing of an examination,—such as is too often given,—an examination that calls for a lot of isolated, unrelated, unimportant details. To meet such an occasion, a student is justified in resorting to the cramming process. But such an examination can have no justification; it has no proper place in a scheme of education.

(4) *Ideational types.* There seems some evidence that an individual learns best material suited to his type of ideation. An auditorily minded person

learns best a material that appeals to auditory imagery; the visually minded person, a material that appeals to visual imagery. But the manner of presentation, *i. e.,* whether through eye or ear, depends much on acquired habit and interest. For in the case of meaningful material, in whatever form it is presented, it is worked over, interpreted, according to one's mental constitution and habits. But there are individual differences and preferences for certain forms of presentation, and also differences due to age. In the earlier years of school life auditory presentation is better, but by the age of nine the visual method begins to prove the better and improves much more than does the auditory. Some investigators have found that if the material to be learned is presented through more than one sense, it is better learned and retained. If the matter is read to the children, and they are also allowed to see it, and in addition also to write or in some way to reproduce it, as by speaking it aloud or silently, then it is better learned. Such methods of presentation probably have the same value as repetition, for that is about what they amount to. They not only make a better initial impression, but may make better associations as well.

Transfer of memory training.—After one has improved his capacity to get and retain ideas in a certain field, does this increase his capacity in other fields? The result of the most careful experiments up to the present time indicate that the result of such practice and training is rather narrow and specific. If, for example, a person is practiced in learning and retaining numbers, this does not help much

in learning letters and figures. Or, if one is practiced in learning meaningful material, it does not help much in learning nonsense material. There are certain habits that function in learning and memory. These habits are specific, but they may be considered general in so far as the situations and procedures in learning are measurably similar. It would be, perhaps, nearer the truth to say that all habits are specific, but that some of the situations in which a habit is applicable are universal. There are certain physical conditions of attending and learning, more or less under the subject's control, that are much the same in all learning, and therefore drill in one form gives efficiency in all the others. In the learning of nonsense material, and to some extent in all rote memory, where the main factor is vividness of impression, getting these favorable conditions for impression is about all that contributes to improvement. But in the case of logical material there are many other factors. There are habits of procedure to be acquired, habits of organising and fixing the ideas, and, in addition, there is an increase of familiarity with the subject matter that improves the learning and memory capacity in that particular kind of subject matter. The latter would not be of service in unrelated matter, but the habits of procedure in learning logical matter doubtless have more or less general application, so that there is such a thing as learning how to learn. But it is not a matter of transfer of training, nor is it a matter of general habits, but is merely a case of acquiring habits whose conditions and situations occur in all learning.

The relation of memory to intelligence.—The relation of memory to learning capacity has been pointed out. What is the relation of memory to general intelligence? What is the relation of memory to class standing? Experimental results are somewhat divergent, but it seems clear that when logical memory tests are carefully made, and when class standing is determined by any adequate method, a fairly high degree of correlation between students' standing as determined by a memory test and their class standing will be found. A very close relation could not be expected, because there are many factors that determine class standing, memory being only one of these factors. Even *ability* to learn is not a sufficient index of class standing, for ability to learn must be coupled with desire and willingness to learn. With other things equal, an efficient memory gives a student a great advantage. Habits of learning and habits of work are very important elements in determining scholarship. It often happens that a person who is quick to learn and has a reliable memory is a poor student, because, knowing that he learns readily, he leaves his learning to the last moment and allows no time for repetition, for more thorough organisation, so that the person with inferior ability, but better habits of work, will excel in class work. However, the *very* best students are those who are gifted by nature in ability to learn and remember, and who, in addition, have good habits of work. In a large class careful experiment will always prove this true.

The function of the teacher in memory work.—Here, as in the case of habit formation, one of the main functions of the teacher is to correct mistakes



The diagram shows the relation of logical memory to intelligence. The number of school grade is represented on the horizontal axis, and the number of ideas retained on the vertical axis. When children of the same age are found distributed through several grades, those in the higher grades have the better memory.

in the early stage of memorisation. When a student sets to work to learn the ideas in a paragraph or page of a book, the first reading may give him some wrong or incorrect ideas, and it often happens that further reading does not disclose these mistakes to the learner, for on successive readings the thing is likely to come with the same meaning as at first, so that the learner is powerless to correct his mistake. Further reading is not only time lost, so far as getting the correct interpretation is concerned, but serves to fix the wrong ideas. The teacher's function here is to use every possible precaution to see that the correct idea is got at the beginning, at the initial reading, before repetition has firmly fixed the wrong idea. A second function of the teacher is to determine the learning capacity and memory efficiency of the different pupils and direct their work in accordance with these facts. The child of quick learning capacity must be taught to take care not to omit proper repetition and organisation, while the slow learner must be taught to work at the highest point of concentration and told that on no account can he afford to neglect the repeated attacks. He should be taught to take advantage of several attacks on a task at different times, and not to depend on long continued, ineffectual repetitions that do not have proper conditions of attention and interest. If the pupils of different learning capacity must work together, then the bright ones should be given enough more work in the same subject or in other subjects so that the two will be on something near an equality. It seems hardly possible to make a greater mistake in the school room than to proceed on the assumption of

equal capacity in all the pupils. It seems probable that every individual has a definite coefficient of learning capacity that is fairly constant. A teacher should know, and know with some degree of exactness, what this coefficient is in the various pupils. There is just as much need for the teacher to know the learning coefficient of his pupils as there is for the engineer to know the efficiency of his engines and machines. The knowledge is necessary for wise action in each case. A knowledge of the individual's ideational type and other individual peculiarities will also be of help to the teacher in determining what forms of material and presentation to use and in understanding the different results of instruction on the different pupils. Not only do the same impressions receive different interpretations by different pupils, but they bring about different reactions, receive different evaluations and take different places in the permanent, organised knowledge of the individuals.

QUESTIONS AND TOPICS FOR FURTHER STUDY.

(The various forms of tests can be given to the class as a whole by the instructor.)

1. Make a brief study of the relation of memory to age as follows: Make out lists of concrete and abstract words, one complete set of each. (See p. 204.) Have four, five, six, seven, eight, nine and ten words in the respective lists of concrete words and the same for the abstract words. Give the test by pronouncing the words and having each list reproduced in writing immediately after it is given. Use only words whose meaning is known to those tested. Do you find an improvement with age as stated in the chapter?

2. Test the logical memory of children of different ages by using a short simple story. Give the test by reading the story to the children and requiring them to write down immediately the ideas remembered. The story can be divided up into ideas or units, and the reproduction of the idea of each unit, not the exact words, is what is required. Do your results correspond to those obtained from the first test?

3. Compare your own memory for various kinds of material with the memory of some one else in the class.

4. Compare the time that is required for you to learn 15 nonsense syllables with the time required to learn 15 English words whose meaning is known to you. Have another person prepare the words and syllables. The words should be of one syllable and the nonsense syllables should have three letters each,—a consonant, then a vowel, then a consonant. Learn each list by reading it through yourself from beginning to end. Count the number of readings required for learning, and consider the list learned when you can say it through without looking at the words, at the same rate that you use for learning them. Which list requires the longer time?

5. If you have ever tried to commit to memory a Latin poem, you probably found it very difficult. Why?

6. Report from your experience or observation a case of poor teaching,—poor for the reason that the pupils did not understand the meaning of the matter presented.

7. Give instances of undue amount of repetition required because of poor initial impressions.

8. Have you ever used any kind of memory device? If so, what was it and what was its value?

9. Compare the method of learning by wholes with the method of learning by parts, by finding a simple poem and learning about 30 lines by each method. You will perhaps need to perform the experiment several times and take the average for each method. If the material used is very even and your condition is maintained uniform, a few tests will be sufficient. The matter may be tested out on the class as a whole by the instructor. The class can be divided into two equal parts by lot or on the basis of tests. One half can then use the one method and the other half the other method, and the results can be compared. If this group method is used, great care must be used to have the work done under uniform conditions,—the same time of day, the same rate of reading, the same criterion of perfect learning, etc.

10. You can test the value of attentive repetitions by learning a few stanzas under good conditions of attention with the time required for learning a similar number when good attention is impossible,—say, in a room where several people are talking.

11. An experiment similar to the above can be performed on the class as a whole by the instructor as follows: The members of the class can spend five minutes on a paragraph in this book that has not been read, then five minutes on another paragraph of equal length. While one paragraph is being read, distractions may be furnished by a metronome and an electric bell. The experiment should be repeated a few times and the averages taken for each of the two procedures.

12. Some time is required for proving that memory improves with practice for the material and method used, but an hour of

hard practice a day for a week ought to show improvement. The question of the transfer of the training can be determined by testing the memory for various forms of material and method before and after the memory training. These tests should be with concrete and abstract words, digits, objects, pictures, and different forms of material in connected thought. Do not expect your experiment to be worth anything unless it is done with the greatest of care.

13. The above experiment could be performed by the class as a whole in the following way: The initial and final tests could be given by the instructor to the whole class; the practice for a week could be done by the individuals in their rooms according to a careful method prescribed by the instructor.

14. The relation of memory to intelligence can be determined by the instructor as follows: The standing of the members of the class in the various memory tests can be correlated with their standing in the subject of Educational Psychology. This correlation may be determined by the Pearson formula, or it may be roughly determined by ranking the class in the tests, from the best to poorest, then ranking them for the standing in psychology. Divide the two lists in the middle. If more than half of the better half in one list is found in the better half of the other list, then there is a correlation between memory and intelligence as your test indicates. Do not attach much importance to your results unless the tests are carefully given and the rank in the class is carefully determined.

15. Try to determine experimentally whether you can learn better by reading yourself or hearing the matter read.

WORDS FOR ROTE MEMORY TEST.

CONCRETE.	ABSTRACT.
1	1
street, ink, lamp.	time, game, scheme.
2	2
spoon, horse, chair, stone.	grade, fact, work, thing.
3	3
ground, clock, boy, chalk, book.	pluck, love, blame, fear, proof.
4	4
desk, milk, hand, card, floor, cat.	space, force, pride, fright, joy, size.
5	5
ball, cup, glass, hat, fork, pole, cloud.	length, light, style, rate, cause, youth, hate.
6	6
coat, girl, house, salt, glove, watch, box, mat.	law, thought, plot, glee, life, call, price, strength.

The words should be pronounced slowly and distinctly and at an even rate, one group at a time. In scoring the results, a word in its proper place can be counted as "two," a word out of its proper place as "one." Inserted words not pronounced should not be counted.

REFERENCES.

FOR SYSTEMATIC TREATMENT:

E. B. Titchener, *A Textbook of Psychology*, 1910, p. 396; G. M. Whipple, *Manual of Mental and Physical Tests*, 1910, pp. 356 and 394; W. James, *Principles of Psychology*, Vol. i, p. 643; *Talks to Teachers*, p. 116; C. H. Judd, *Psychology*, 1907, p. 231; J. R. Angell, *Psychology*, 1908, p. 222; R. M. Yerkes, *Introduction to Psychology*, 1911, pp. 189 and 300; H. Münsterberg, *Psychology and the Teacher*, 1909, p. 137; H. J. Watt, *The Economy and Training of Memory*, 1909.

ORIGINAL STUDIES:

T. L. Bolton, *The Growth of Memory in School Children*, in *American Journal of Psychology*, Vol. iv, p. 362; M. W. Calkins, *A Study of Immediate and Delayed Recall of the Concrete and the Verbal*, in *Psychological Review*, Vol. v, p. 451; E. A. McC. Gamble, *A Study in Memorizing Various Materials by the Reconstruction Method, Psych. Review, Monograph Supplement*, Vol. x, No. 43, 1909; C. J. Hawkins, *Experiments on Memory Types*, in *Psych. Review*, Vol. iv, p. 289; E. A. Kirkpatrick, *An Experimental Study of Memory*, in *Psych. Review*, Vol. i, p. 602; F. Smedley, *Report of Department of Child-Study and Pedagogic Investigation*, Chicago Public Schools, No. 3, 1900-1901; W. G. Smith, *The Relation of Attention to Memory*, in *Mind*, n. s., No. 4, p. 47; *The Place of Repetition in Memory*, in *Psych. Review*, Vol. iii, p. 21; E. N. Henderson, *A Study of Memory for Connected Trains of Thought, Psych. Rev., Mon. Sup.*, Vol. v, 1903, No. 23; J. C. Shaw, *A Test of Memory in School Children*, in *Pedagogical Seminary*, Vol. iv, p. 61; W. H. Pyle, *The Function of the Teacher in Memory Work*, in *Journal of Educational Psychology*, Vol. i, p. 474; *The Most Economical Unit for Committing to Memory*, in *Journal of Educational Psychology*, Vol. ii, p. 133; *Retention as Related to Repetition*, in *Journal of Educational Psychology*, Vol. ii, p. 311; H. Münsterberg and J. Bigham, *Memory*, in *Psych. Rev.*, Vol. i, p. 34; J. Bigham, *Memory, Psych. Rev.*, Vol. i, p. 453; C. Guillet, *Retention in Child and Adult*, in *American Journal of Psychology*, Vol. xx, p. 318.

Chapter XIV.

ATTENTION.

Attention is a term applied to the arrangement of the contents of consciousness, at a given time, on the basis of sensory clearness. At any given time some conscious processes are clear, others relatively obscure. We commonly say that the clear processes are attended to and that the unclear are not attended to. This popular way of speaking of the facts is somewhat unfortunate, for it implies that there are mental processes and, in addition, something else that can take up an attitude toward these processes; that the conscious processes go filing by some sort of arbiter that seizes upon some of them and lets the others go. But such crude notions as this can not be held by a scientific psychology that knows only the mental processes themselves. Mental processes are the sum-total of consciousness. It would be more accurate to say that mental processes are experienced in a state of attention when they are clear. By 'attending to' we should mean only that the process in question is relatively clear in comparison with other simultaneous mental processes. The clear, then, is the 'attended to' and the unclear is the 'not attended to.'

The neurological point of view.—There is a point of view, however, that gives some justification for using the term in something like its old meaning,—the point of view of neurology or physiology. If

instead of a mental arbiter that is free to choose or select we substitute our physical bodies, with their nervous systems, there is some sense in saying that we attend to this or that. What we mean is that the nervous activity, which is the condition of our mental life, determines what mental processes shall be clear and what unclear. Our nervous system selects, chooses. This system is constantly stimulated by the environment, and there is a constant, ceaseless change in the distribution of nervous activity. The shift and change of clearness in mental processes parallels, and is conditioned by, this shift and change of nervous activity. In a sense, then, the nervous system selects and chooses, but this selection is entirely mechanical. The arrangement and distribution of nervous activities at any moment is dependent upon past activities, ultimately upon heredity and environment.

It is important that teachers understand this clearly, for such a point of view brings the problem of attention out of the clouds of an impossible metaphysics and puts it on a basis of fact. If the mind is an entity that attends or may not attend, as it pleases, then there can be no science of attention, there can be no training or direction of attention. But if attention is a matter of sensory clearness depending upon the changing equilibrium of nervous activity, upon nervous habits, inherited and acquired, there can be a science of attention, and great possibilities of training and direction appear. This control and direction of the attention of the pupils depends upon our manipulation of the pupils' environment, just as every aspect of training depends upon such manipulation.

We can, however, now, since we know what we mean, continue to use the language of every day life and say that we attend to this or that. A concrete illustration will make the matter plain. Just now my consciousness was chiefly clock-tick, *i. e.*, the mental process, which I may call "clock-tick," was clear, stood out distinct from other processes,—these other processes being pressure sensations from my clothes, sounds from a dripping faucet, a sort of general warmth and discomfort, and vague visual perceptions of various objects in the room. Now, I say that I was attending to the clock-tick and not attending to the other processes, when all that I can mean is that the clock-tick was clearer than the other processes. A moment later the whole pattern of consciousness was changed. The clock-tick became obscure, went almost below the conscious level, while noises from the stairway became clear. And in like manner the contents of consciousness are continually shifting. A process now clear presently is obscure, while some other process rises to maximal clearness, and the processes of a succeeding moment may be entirely different and with their own distribution of clearness values.

The two phases of attention, active and passive.— There are two phases in the development of attention. Some processes easily and naturally become clear and run their course in the focus of attention. Such attention is termed passive. It is occasioned by stimuli of certain qualities and by intensive, sudden, repeated, novel and congruous stimuli. When two such stimuli simultaneously act upon the organism neither one occasions a mental process that holds

its own in the focus of attention without interruption from the other. Attention under such circumstances is termed active, secondary or voluntary. It is only a temporary stage, for repetition of the situation soon brings about the passive stage. The basis of the passive attention is habit in the nervous system, a definite order of nervous change that results from repeated experience. Professor Titchener has made very clear the nature of these two forms of attention and we can not do better than to quote the passage: "Secondary [active] attention is a necessary consequence of a complicated nervous system. Let us take an imaginary case: the case of an animal endowed with two sense organs, an eye and an ear. Suppose that such an animal is exposed, at the same moment, to two different stimuli, a bright light in front of it and a loud sound at its side. It can not afford to neglect either. Hence it will attend, first, to the stimulus which has the greater attractive force; but, then, having attended to that, it will at once turn its attention to the other: and so there will be a seesaw of light and sound at the focus of consciousness, a quick succession of primary attention. * * * Now take a case that lies nearer home. Suppose that you are in your room preparing for tomorrow's examination, and that you hear an alarm of fire in a neighboring street. Both ideas, the idea of examination and the idea of fire, are imperative; there is a conflict. The cortex is set in one part for work, and this setting is reinforced by a large number of associated excitations,—the nervous processes corresponding to ideas of the examination mark, the consequences of failure, and so on. The cortex is set

in another part for going to the fire, and this setting is similarly reinforced by the processes corresponding to the ideas of a run in the fresh air, an exciting scene, a possible rescue, and so on. The struggle may last for some time, and its effects may persist for a while after you have made your choice. So long as there is any trace of it, your attention is secondary or 'active' attention. * * * The making of a choice means, of course, that the stronger of the two conflicting forces, the rival excitatory processes, has won the day, and the traces of the struggle that persist after the choice has been made mean that the victory has not been absolutely complete. If experiences of the sort are often repeated, so that a habit is set up,—a habit of work or a habit of play,—then the struggle is brief, and secondary attention is quickly replaced by primary. * * * This nervous system of ours, which is the scene of the conflict in secondary attention, has a long evolutionary history. We are not all born equal; we are born with nervous systems that bear upon them a certain hereditary stamp, that already have within them lines of less and lines of greater functional resistance. The poet, we say, is born and not made, and to a certain extent, if the phrase is permitted, we are all of us born and not made. On the other hand, the child's nervous system is exceedingly plastic and impressionable; it is easily moulded by education; so that, to quote another current saying, habit may become second nature. The leanings and aptitudes and predilections that we show in adult life are, then, the resultant of two influences, heredity and education, nature and nurture."*

Text-Book of Psychology, 1910.

Function of attention.—The function of attention, on the side of mind, is the unification of consciousness, and on the side of body it is the unification of movement. Combining both points of view in that of psychophysics, we may say that the function of attention is the unification of action. It is quite evident that attention is closely related to action. Stimulation is the initiation of action. Now, in such complex organisms as man, there are always several stimuli acting upon the nervous system at the same time. The organism can not respond to all of these simultaneous stimuli at the same time. It is a unity and there must be organisation and unity in its actions. Therefore natural selection has developed the attentive individual. The nervous system constantly chooses and selects in the sense that there is always a center or focus of nervous activity as the resultant of all the various stimulations. It is this center or focus that determines the response of the individual. Clearness of consciousness, on the mental side, is the parallel of the center or focus of nervous activity. Or, to lay aside the distinction of mind and body, we may say that the attentive consciousness is the determinant of response. It is almost as if we had several minds of various degrees of clearness value, but the clearest, with the nervous processes which correspond to it, always usurps the function of action.

Attention and education.—If we are right in our assumption that education is to perfect adjustments, and if the conclusion of the last paragraph, that attention unifies action, is sound, then it follows that attention and education have intimate relations. Let us see what these are. It is evident that attention is

important for both aspects of education. On the knowledge side, in the getting and retaining of ideas, it is only the attentive consciousness that counts, and on the side of expression we have seen that in the formation of habits it is only attentive practice, attentive drill, that is effective.

(1) One of the functions of education is to remove consciousness from the level of active attention to that of passive attention in as many fields of activity as possible. If children are ever to be adequately adjusted, if they are ever to move freely, easily and efficiently in the fields of their activity, then the aspects of these fields of activity must be made matters of passive attention. Consider the various branches of study: in mathematics the facts, at first, are matters of active attention; they are in the focus of attention for but short intervals of time, giving way to ideas and perceptions of marbles, tops, balls, and various other things that are much more interesting and that seem to have no trouble in getting into the focus of attention and remaining there indefinitely. But through the influence of the child's teachers the mathematical ideas are continually brought to the focus of attention, although for brief intervals, until finally they are attended to with ease, and seem to have no trouble in holding their own in consciousness for hours at a time. Such development is found to occur in every field of mental activity, in all the school subjects. When as a child the entomologist studied insects, they may have been objects of passive attention for him for short periods of time, but if he became a student of insects there were long periods of hard study, when "bugs" had many rivals for the

focus of attention, and successful rivals, too. But now, after many years of study, the world is to him a world of insects; there is little else in it. For days and weeks he lives among them, nothing else is so interesting, there is scarcely any lasting consciousness other than an insect consciousness. This is always true of efficient men. One never moves with efficiency anywhere until consciousness there is on the level of passive attention. It could not be otherwise. Life is action; action flows from the attentive consciousness. There can be no consistent action as long as there is vacillation of attention, as long as there is conflict and uncertainty. And from the point of view of constructive thought we come to the same conclusion. One's thoughts on any subject will never amount to anything as long as the ideas on that subject have but a fleeting existence in the focus of consciousness. One thinks efficiently in any field only when he can not keep the ideas of that subject out of the mind. Therefore, viewing education from the standpoint of attention, its function is seen to be the *development of the passive attention in the line of life's activities*. How can this be done?

(2) We can get our first answer to the above question by a consideration of the factors that give rise to passive attention. We found them to be certain qualities, intensity, suddenness, repetition, novelty and congruity. Our inherited nervous system is such that certain qualities always attract attention; the sudden stimulus, the repeated stimulus, the intensive stimulus, the congruous and the novel stimulus are intrinsically effective for consciousness. We can not keep from attending to the mental processes to which

they give rise. All through life these factors are effective, and there is always a certain legitimate use to be made of them. Movement can usually be depended upon to attract attention. The child is nearly always ready to attend to the moving thing and to the thing that has life. Novelty is also usually effective. The lazy, incompetent teacher settles down to a monotonous procedure, a continuous repetition of a formal scheme. As a result, the pupils have no interest and make little progress. The competent teacher, while adhering to a system, constantly is finding new aspects, new details of familiar things, and although having a definite procedure, finds possibilities of variation. The result is interested children that make progress. But perhaps greater mistakes are made by failing to take into account the fact that the congruous attracts attention. In ordinary school work that consists so largely in getting ideas, in dealing with symbols, teachers forget that ideas that have little meaning will not remain long in attention. Getting ideas is a system of grafting, and an idea can not be grafted onto an alien stock. It is the teacher's business to find a group of old ideas that can receive the new. We have to start with only the stock that nature gives us, the instincts, and the ideas that have resulted from their activities, together with habits that have been formed upon instincts as an ultimate basis. Budding and grafting onto this native stock is our only possibility. Professor Münsterberg* has emphasised this factor of attention, as contrasted with the others which he speaks of as being objective, while this he calls sub-

*H. Münsterberg, *Psychology and the Teacher*, p. 163.

jective. As a matter of fact, all the factors have the same basis, namely, the nature of the individual as dependent upon his past life. But he is right in emphasising the importance of this factor. If we wish to create the possibility of long and effective attention in any aspect of life, we can do so adequately only by patiently building up a body of organised experience in that aspect of life. The basis of attention is always the same,—the needs of the individual. The baby and the young child have no trouble in attending to almost everything in their immediate environment. They handle it, taste it, pound it. When we undertake the child's formal education one of our greatest mistakes is that we try to interest him in aspects of life that have no meaning for him, and he therefore feels no need for the new ideas; they have no relation to his past experience. A child is not going to pay very much attention to new ideas that can not be identified with his needs, *i. e.,* brought into relation to his old ideas.

(3) *Training the attention.* In what sense can we speak of training the attention? In the language of a faculty psychology, attention would be a power of mind that could be improved by training. But if we are to consider attention as only the clearness aspect of conscious processes, what about training? There is no training in the sense that consciousness is something in which there is no attention, but which acquires attention by training. Consciousness is always attentive in the sense that there is always some sort of distribution of clearness values. What we are accustomed to call training the attention would be better spoken of as training in habits of learning.

A pupil can be trained, for example, to sit down and prepare a geometry lesson in spite of all sorts of difficulties and distractions. Such training comes about in something like the following fashion: When young the child is given some task to perform. He starts at it, but later sees something which interests him more; he leaves his task and turns to the other matter. In some form or other he is punished for neglecting the task, and is told that when he starts to do anything he must not leave it till it is finished. By suitable repetitions of such experience the child, by and by forms an ideal that may crystallize into some such words as, "a task to be performed, stick to it till it is finished." The ideal extends itself to include self-imposed tasks. Whenever, in the performance of a task, there comes temptation to leave it and take up something else, there may come up the words expressing these ideals of work, and with them memories of painful experiences that had come from neglected tasks, all of which serve to inhibit action upon the initiative of the tempting idea. The pupil says to himself, "Where was I reading? Oh, yes, the square of the hypotenuse," etc. And the interrupted work proceeds. But a training with such results is really a training in habits of work, is a training in a certain response to a certain kind of situation, and is in no proper sense a training of attention. It is a training, however, that results in maintaining attention along certain lines of thought, when without such training there would be a shift in the direction of attention. For this reason there is no objection to calling it a training of attention. And it is needless to say that it is one of the most valuable trainings

that a person can have. As a result of it, one is able to sit down to his study table, perhaps with headache, toothache and memories of unpleasant experiences of the day, and go to work. At first the ideas of the study taken up may have but a fleeting existence till they are driven out by toothache, but we say, "No, I must go ahead with this work; now, where was I? I was just taking up the function of attention," etc., and so after a little time, after a little seesawing back and forth, the ideas of our work are focal, all else is gone, and we may work on for hours without headache, toothache or memories becoming focal. The ability to act in this way is the result of training, and it might very well be called a training in attention, since it enables one, by his habitual way of meeting a definite situation, to direct the line of his attention. Without such a habit well established no one ever accomplishes anything, for there is nearly always the toothache, headache, memory, or something else to detract us from our tasks, and we have to resort to tricks and devices to hold ourselves to our work. And this is what Münsterberg calls subjective control; it is taking the control of our destiny out of the hands of a changing environment and putting it within ourselves. One of the results of such training is that it actually varies somewhat the type of attention. When one, by training, becomes able to hold himself to the same task of thought for a long time, it brings about a sort of mono-ideism. Ideas hovering about the central thought continually come; all other incongruous ideas are inhibited. Such thought becomes in the highest degree effective, for as the

result of the high degree of nervous activity the radiations go into every associate path; our whole experience is brought to bear on the topic in hand. Consciousness is enabled to work at its highest point of efficiency. But such a habit, on the part of a child, can not be formed in a day. And in any case the child can not transcend his nature. He must come to see that it is by sticking to his task that he can work out his ends and accomplish his purposes. And the things that one can work at for hours are always the things that concern one, things that are worth while. There is no training known among men that can keep long before consciousness anything that does not make in rather strong degree some one of the natural appeals to be there.

(4) One reason that attention is often poor in school is because so much of the work is dealing with symbols instead of realities. The child is by nature not very much interested in symbols. They are not so apt to bite him as a snake is, and they are not so sweet as candy. The child gets an interest in the symbols only after they are identified with some of his natural interests. Such identification is made, for example, when a child learns that by writing c a n d y he can get some of the sweet to eat. More of the school work should deal with the living and actual realities, and, in the second place, the teacher should take greater pains to identify the symbols with the needs of the child in as direct a way as possible. It is strange that the schools have got so far away from nature, and that the life of the school has got so far away from the real life of the world.

QUESTIONS AND TOPICS FOR FURTHER STUDY.

1. Analyze your consciousness at several times, noting the distribution of the various processes on the basis of clearness. Write out your description of these states, estimating the clearness of the various sensations, perceptions and ideas.
2. Give from your experience illustrations of primary and secondary attention. Illustrate, from actual experience, the development of primary out of secondary attention.
3. Apply to different school studies the statement that the aim of education, from the point of view of attention, is to reduce as many of the fundamental activities as possible to the realm of primary attention.
4. What is meant by "habit of attention"? Can there be such a thing as habit of inattention?
5. Suppose that a teacher notices that certain pupils are usually inattentive to the regular work of the class, how could he determine the cause of inattention? What possibilities are there? Give, if you can, an example of such a case, its cause and the cure.
6. Have you any acquired acts from which attention has entirely disappeared?
7. Can the development of primary attention in one field incapacitate one for attention in another unrelated field? Illustrate.
8. Visit several rooms in the public school and note the differences in attention, and endeavor to discover the reasons for the differences.
9. Are we justified in having quietude for study, or should we train ourselves to study in the midst of distractions, such as conversations?
10. Make a careful analysis of your consciousness from the point of view of attention while playing the piano and singing at the same time. Does your attention shift from one to the other, or is one process continually low in clearness value? Does either process ever go entirely below the level of consciousness?
11. From the point of view of attention, can you justify or must you condemn the practice of beginning one recitation by reviewing the preceding?
12. Does the length of time that we can hold the attention of a child depend on the subject-matter?
13. In what sense can you force a pupil to give attention? Illustrate.
14. Should a teacher ever attempt to secure attention to the subject that is before the class by telling jokes or by making unusual movements or noises?
15. Can you get a child to attend to anything that has no interest for him?
16. Show fully how it is possible for something that has no interest in itself for a child to acquire an interest by being connected with something else intrinsically interesting. Illustrate from your own experience.

17. Should children be allowed to specialize in subjects in which they seem to have great natural capacity and interest?

18. Do you think that any normal child can become interested in, and pursue profitably, *all* the school subjects? Give the evidence on which your answer is based.

19. What is the effect on a child of having him in a grade that is quite too hard for him?

20. What is usually the trouble when the majority of an audience pay little attention to a lecture or sermon?

21. What distribution of work, play and rest should there be in the primary grades? How long can a child give effective attention?

22. In what sense is attention dependent upon bodily nourishment?

REFERENCES.

FOR SYSTEMATIC TREATMENT:

E. B. Titchener, *Textbook of Psychology*, 1910, p. 265; *Lectures on the Elementary Psychology of Feeling and Attention*, 1908, Chs. v-vii; W. James, *Principles of Psychology*, Vol. i, Ch. xi; *Talks to Teachers*, Ch. xi; *Briefer Course*, Ch. xiii; J. R. Angell, *Psychology*, 1905, p. 64; Ebbinghaus, *Psychology*, 1908, p. 87; R. M. Yerkes, *Introduction to Psychology*, 1911, p. 292; C. H. Judd, *Psychology*, 1907, p. 189; W. B. Pillsbury, *Attention*, 1908; H. Münsterberg, *Psychology and the Teacher*, Ch. xviii.

ORIGINAL STUDIES: L. R. Geissler, *On the Measurement of Attention*, in *American Journal of Psychology*, Vol. xx, p. 473, an exhaustive experimental study; H. W. Chase, *Some Aspects of the Attention Problem*, in *Ped. Sem.*, Vol. xvi, p. 281.

Chapter XV

THINKING.

Association of ideas.—One characteristic of man that distinguishes him, perhaps, from most of the lower animals, is that he has images and ideas. His life is not merely a perceptual life. His experiences may be lived again. What is at one time sensation, may be experienced again as image; what is at one time perception, may be experienced again as idea. One may see, today, a bridge over a river, and tomorrow, hundreds of miles away, may see the bridge again as idea. What interests us here, however, is the fact that when tomorrow the bridge comes back to us as visual image or idea there come also other ideas which correspond to perceptions which we had along with that of the bridge. While crossing the bridge we were riding with our friend, Mr. X, talking about the political campaign. This all comes back to us now as we think of the bridge. This grouping together of images and ideas in accordance with our past experience is known as the *association of ideas.* The law of this association is that *what is experienced together or in close succession once, either as perceptions or ideas, is likely to be so experienced again.* A child may see a sheep and hear it bleat; afterward it may see a sheep or a picture of a sheep or in any way have the idea of sheep brought to mind and have also the idea of bleating. So close is such an association—an animal with its character-

istic sound—that a child is likely to name an animal "after" this sound, or characteristic action. It is in this way that our experiences are built up. Experiencing things together and in various combinations is what makes knowledge and its organisation possible. The child not only sees the sheep and hears it bleat, but sees it eat grass, sees the wool clipped from its back, sees this wool pass through various stages of manufacture, sees the sheep's young, eats sheep,—in a word,—the child sees sheep in a great multitude of situations and relations. These sheep experiences of the child, from first to last, are built together into an organised whole, and may serve as a type of what constitutes knowledge. After the child has lived in this world for several years, he has built up an inner world corresponding to the outer world. The relationships in time and space of the objects in the outer world have their correspondence in the inner world of ideas. The objects of the outer world are grouped in infinite fashion, so are our ideas. When one thinks of the intricacy and complexity of mental life, one is likely to think that so simple a bond as contiguity, so simple a thing as being together in time and space can not explain all the connections to be found in mind. Three considerations may help to make the matter believable: (1) We can observe association in its simplicity in a young child, where in most cases, the basis of the connections of ideas is clear. The experience of the young child is so limited, that in most cases, it is easy to explain the flow of ideas from one to another. (2) We must also bear in mind that the external relations of objects are, indeed, infinite. Therefore a

person that has lived here for a great many years has experienced the objects of the world in a great complexity of relationships. (3) All our experience is bound together through mediating experiences. All the experiences of life are therefore organised into a whole. Let us illustrate: The bray of a mule may make one think of Christ or one's first sweetheart or perhaps of Pittsburgh,—of Christ, because one has read of the triumphal entry into Jerusalem; of one's first sweetheart, because perchance once while driving with that lovely damsel, one collided with a mule; of Pittsburgh, because one has seen coal wagons drawn by mules and been told by the driver that the coal was mined at Pittsburgh.

The reader may think that such explanations raise more difficulties than they explain. What determines the succession of ideas when each may appear in many settings? There are several determining factors;* among them being recency, frequency and mental "set." Other things equal, the more recently objects have been experienced together or in close succession, the more likely is the perception or idea of one to be followed by the idea of the other. Other things equal, the more frequently objects have been experienced together in the past, either as perceptions or ideas, the more likely is the idea of one to be followed by that of the other. But, other things equal, one's mental set,—one's frame of mind, mood, or present problem,—determines what idea, out of all the possibilities, will follow the one now focal. If one is reading the bible or taking part in a funeral

*A complete list would include primacy, intensity and possibly other factors.

procession, the bray may bring the triumphal entry to mind; if one is reading a love scene in the latest novel, then, perhaps, the bray brings up an image of the early loved one. One must also remember that the basis of association is to be found in the nervous system, but of the details of the neural conditions of association, we know little. We have sufficient evidence, however, to make us believe that our ideas and images, as well as our perceptions and sensations, have their neural conditions without which they could not occur. The fact of brain activity being the condition of mental activity helps somewhat to understand association. Let us see:

Our ideas have as their conditions brain activities. The sphere of the latter is nerve cells. These nerve cells are all bound together by fibers. Brain activity in one group of cells arouses activities in other groups of cells. The laws of recency, frequency and mental "set" doubtless have their ultimate *explanation* in the physiology of the brain. Let us be clear as to the situation. The laws of recency, frequency and mental "set" are descriptive statements of psychological facts that have been fairly well demonstrated inductively and experimentally. The physiological explanation is a hypothesis. It has, however, many facts to support it.

Imagination.—In chapter XIII we distinguished two kinds of images, the image of memory and the image of imagination. If an idea has accompanying ideas to give it setting in time and space, we call it memory. If it lack those accompanying processes which give it a feeling of familiarity, we call it imagination. Imagination and memory are, then,

the terms that designate the two extremes of our forms of imagery. We have learned that memory plays an important part in the life of man. So, also, does imagination. It gives color to the bare, prosaic affairs of life. To illustrate: The calendar on my wall has on it a simple picture of several pretty Jersey heifers standing in a grassy meadow, with a background of trees, mountains and blue sky. As I look at the picture scores of images come and go. Some of them are clearly images with definite settings, but there are also many more images more or less vague and fleeting. I see now a rabbit here, a bird there, some people yonder. In a word, the little picture seems only a stage on which are enacted in quick succession the scenes of an endless drama. Very prominent are the feelings that these images have brought and left. The picture has brought back to me for the moment my childhood days, clover fields and bumblebees, and over all is a characteristic mood. If we had no imagination a picture would mean nothing to us, but since we have it the picture can call forth a train of ideas and images with their accompanying feelings. The greatness of a picture may be measured by its power to call forth images of memory and imagination. This same thing is true of literature. The words of the poet, novelist or historian are but the means of enabling us to picture forth an imaginary world. The words call up bits of experience from various parts of our past life which fit together into a harmonious whole. To illustrate, let the reader read such a thing as Tennyson's *Crossing the Bar,* or Joaquin Miller's *Columbus,* and by introspection determine the sequence of ideas. The

result, of course, will be different for different people, but for all there will come a train of ideas, for the most part, images of imagination, visual, auditory and kinaesthetic, which arouse a very definite mood and frame of mind. It is such imagery that enriches our experience. Nearly everything that we see or hear brings up some past experience as memory or imagination, and this revived experience, this imagination, clothes the bare skeleton of perceptual experience.

Thinking.—By thinking, in a broad sense, we usually mean the succession in our mind of ideas, either of memory or imagination. This flow of ideas, in accordance with the law of association, is called thought. Directed or purposive thought may be called *reason*. In reasoning we are solving a problem, meeting a situation. To illustrate: I go down town with my umbrella and come back without it. As I hang up my hat I miss my umbrella from the rack where I am used to seeing it. I then have an image of myself going off with the umbrella. I say, "Where did I leave it?" I then see myself in the postoffice, and see myself leaving with it. I did not leave it there. I see myself in the bank. I stood the umbrella in the corner while I wrote a check. I left the bank putting the money into my purse. There I left the umbrella. I go to the bank at once and find that the cashier has put my umbrella away for me. This is thinking in terms of memory images.

Again, suppose one is asked whether dew is more likely to form on a clear night or on a cloudy night. One says: "Let me see," and then has a succession of ideas concerning the nature of dew, the cause of

dew, etc. One thinks in terms of memory images, of clear skies, their causes and consequences, of cloudy skies and their causes and consequences, and presently says, "Why, on clear nights, because on clear nights the grass cools by radiation and the surrounding air is cooled to the dew point. On cloudy nights radiation is largely checked, the air does not cool down to the dew point." The following may further illustrate the action aspect of reasoning: A boy, walking alone in a wood, comes to a stream, too wide for him to jump across. He pauses, looks about and sees on the bank a pole and several large stones. He has walked on poles and fences, he therefore sees himself putting the pole across and walking on it, but before having time to do it, he recalls walking on poles that had turned. The perception of stones now becomes focal, and since no inhibiting ideas arise, they are soon piled into the stream and the boy walks across. This flow of ideas leading up to the action takes different forms,—it is not always visual imagery, it may be auditory or kinaesthetic, and as we grow older, it is very likely to be in the form of verbal ideas or actually spoken words. But whatever the form, the result is the same.

In reasoning, then, we meet a situation that must be solved. In accordance with the law of association the situation arouses first one idea from our past experience, then another, till our problem is solved. The problem is solved when we come to a state of belief. The whole process, the associations and the state of belief, is dependent upon our past experience. One's experience may be entirely inadequate, one may reach a wrong solution. But in any case,

the material is the same,—our experience; and the method is the same,—association, or rather, the recall of ideas in accordance with the law of association. In the highest form of abstract reasoning the process is not essentially different. One can in no case do more than await the flow of ideas that follow upon the situation presented by the problem, and both the ideas one has and the nature of their association are dependent upon experience. The flow of ideas proceeds until one comes that fits the situation, so far as one's experience is concerned.

Suppose one is asked if it is ever right to tell a lie. One then has in succession a number of ideas, usually memories, of lies of various kinds told by himself or others under various situations, one remembers the results; one also has a succession of ideas relating to right and wrong conduct; these may depend upon our early training and the ideals that we formed as a result. This is probably crystallized into a verbal expression, such as "The end justifies the means," "Tell the truth at all hazards," etc. Finally a norm of conduct and the particular situation presented come together in consciousness, excluding or inhibiting other ideas, the problem is solved, we feel content, we have belief.

Training in reasoning.—In a very definite sense one can be trained in reasoning. Of course, the basis is perceptual experience. If a child is ever to reason as a physicist, he must have a wide experience with the physical world, he must see falling bodies and measure their increments, he must heat bodies and measure their expansion, he must have a wide experience with electricity, sound and light. After

such wide experience, when the physicist is confronted with a problem, he solves it as follows: The situation presented in the problem arouses, in accordance with the law of association, various ideas until he has an idea that pictures just such a situation as the present with such and such an outcome. Until such an idea comes, then, the physicist cannot solve his problem without resorting to experiment. He says: "I do not know, I shall try it and see." I once asked a physicist which would freeze first, a pan of cold water or one of hot water, placed out of doors on a cold day. He replied that there was no reason why the cold one should not freeze first, and besides he said he had tried the experiment and found the cold water froze first. This illustrates the usual procedure of science. When a new problem is presented, by direct manipulation, the scientist produces the required situation and observes the result. He then has a new mental connection or association ready to function in the future. One can, then, train children to think, first of all, by leading them to get a wide and rich experience,—experience in the realm wherein they are to think. This is primary, for without experience there can be no thought. A teacher can further help the child (1) by directing attention to important aspects of experience, helping in the analysis and synthesis of experience. (2) In the next place the teacher can aid the pupil by encouraging a habit of cautious procedure. A child may accept the first idea that comes as the solution to his problem; he may not be critical,—he can be led to form the habit of waiting, of saying, "hold on here, let us see, may be it is not this way," then other ideas

come, and others, then the first again, perhaps. Finally, after change of ideas back and forth, a certain idea persists as a solution of the situation. In such a case, if the experience of the individual has been broad enough, the solution is likely to be correct. (3) The child can also be encouraged to form a habit of putting the solution reached as above described to some crucial test. This is illustrated in the case of the physicist. He was pretty sure about the freezing of the water, but still there might be some factor that he had never considered, so he puts the matter to the test of direct experiment,—this is a habit with him, as it is with all men who deal with natural and physical science.

To illustrate further, suppose one asks a boy what will happen if a strip of iron be firmly riveted to another strip of copper and the strips heated. The boy can solve the problem provided he has noted the relative expansion of iron and copper when heated. The situation will soon bring the proper ideas. But if he knows only that metals usually expand when heated, but does not know the relative expansion of iron and copper, he will not be able to solve the problem; he must experiment. But in either case, in the early stages of intellectual progress, he should be encouraged to verify his conclusions by resorting to experiment or some form of crucial test. First the problem, then the solution, then the test. And in each of the steps the teacher can be of much service to the pupil. The teacher's function here is to direct the experience of the child, set the proper kind of problems, and aid in the forming of proper habits of approach to their solution. In the early stages of prog-

ress in reasoning, imitation will function as an important factor. But later through imitation a child gains a lot of experience that functions directly in the solution of problems.

While one can be trained in reasoning, this training is to a large degree specific. In the first place, because in thinking or in reasoning, we can only have ideas that have grown out of our experience. The material of thought is ideas, and the basis of ideas is experience. One cannot reason in a field where he has had no experience. Therefore a person who had spent his life as a botanist and had little or no experience in other fields could not reason in those other fields. One would not think of going to such a man to have him solve a problem in medicine, or law, or in engineering. One cannot reason where he has no facts. Then there is a further reason why training in reasoning is specific. There are certain habits of procedure best adapted to solving the problems presented in the various fields of thought. One habitually puts to himself certain forms of questions that best lead to the proper solution of the problem. This is the reason why men who successfully meet the situations of their own profession so often utterly fail when called upon to meet unfamiliar situations in other fields. Often a scientist attempts to solve a problem in another science than his own, the result is usually to make himself ridiculous. It may be that there are certain forms of thought that are to some extent universal, forms which one learns by studying logic and mathematics. But, as a matter of fact, the great thinkers in the various spheres of thought have not learned to think by a formal study of rea-

soning. They have become great thinkers in their science by *thinking in that science.* Of course some fields of thought are so closely allied both as to matter and method that practice in one would give help in the other; such intimate relationships exist between zoology and botany, physics and chemistry, mathematics and astronomy.

It follows, then, that children should have a wide experience, and a wide training in thinking. They must be trained in meeting the thought situations in the myriad aspects of life. As they grow older they should have more intensive training in the narrow sphere of their life-work.

Meaning.—The meaning of an idea is another idea or group of ideas that always accompanies it in certain situations. These accompanying ideas have reference to our needs in the definite situation. Meaning is best understood when considered with reference to action. Ordinarily the situations of life call for action. Constantly, as long as we live, we must be meeting situations. We are sitting in our library reading when the door bell rings. What does the ringing of the door bell *mean?* That some one wants to see me, that I must go to the door and let him in. When the bell rings I have a vague image of some one standing at the door and of myself letting him in. These ideas that accompany the ringing are its meaning. They are often very schematic. The perception or idea may throw us into a "set" or attitude that determines action, but is very poor in conscious contents. We may even open the door unconsciously, automatically.

A perception at first may have no meaning because

it is new to experience. We may see an object for the first time; it is unfamiliar; it arouses no associate ideas. We do not know what to do with the new thing. Curiosity prompts us to touch it. Some barbs, perhaps, stick our fingers. Henceforth, the thing has some meaning to us. When we see it, we remember the pain, we turn away from it, we leave it alone. It now has meaning; it is a thing that pricks. The structural and functional aspects are clear. When we meet the things of the world we have to take up an attitude toward them; afterward, when we experience these things in perception or idea, our previous responses and their consequences come to us in accordance with the law of association. This accompaniment is the structural aspect of meaning. Now since our response is always an important aspect of this association, functionally, we may say that by meaning we mean *use*. A thing *means* what we can do with it. And from both points of view a thing means different things in different situations.

It is evident that from the point of view of the active life of an individual the meaning of an idea is the most important thing about it. It is ideas with their meaning that are determined by association; it is ideas with their meaning that are the important factors in reasoning, and that on the side of consciousness represent the determinant of action. Certainly from the point of view of a teacher, an idea is important only in so far as it has meaning. What does Lincoln mean? What does Napoleon mean? What does Hamlet mean? What does the civil war mean? What does evolution mean? What does democracy mean? So far as the getting of knowl-

edge is concerned, the function of the teacher is largely to assist the pupil to organize his knowledge with reference to meaning.

Reason and education.—We have considered education as a process by which a child becomes adjusted to its environment. From this point of view the place and importance of instincts, habit, memory and attention have been considered. What, let us now ask, is the function of reasoning in such a system as we have outlined? Efficient action has been held before us as the aim of education. Efficient action must have an instinctive or habitual basis. But human life is so complex that new situations are constantly arising, for which there is no organized form of response, but for which any one of several forms of instinctive or habitual action may, perhaps, be more or less adequate. However, since the situation is new or has some new aspect, no response comes immediately. There is a pause between stimulus and response. At such a juncture, reasoning, as we have defined it, takes places. The conditions which give rise to reasoning, then, are always more or less new in the life of the individual. As a result of the associative processes, the difficulty of the new situation is met by *some* sort of action. Afterward, with repetition of the situation, the action becomes habitual.

Of course, the passage of action from the stage of reason to that of habit is not always so simple. The first response to a new situation may bring unhappy results. The appearance of an appropriate response, in such a case, is delayed till a later appearance of the situation. But in such cases reasoning fails of

its function, which is to secure *in a new situation* the best possible form of response as dependent upon the experience of the individual. It is evident that reasoning indicates a stage of incomplete adjustment when there is a pause, as indicated above, between stimulus and response. During this pause association brings various ideas to consciousness. Finally, some one of these ideas becomes, for the time, focal, and action ensues. The length of the pause for the appearance of ideas, and the fulness and adequacy of association, may be taken as a measure of intelligence. For, although reasoning represents a stage of incomplete adjustment, it is a means of meeting new situations with some success without making the individual entirely dependent upon the costly method of trial and error. That education would seem to be most effective *that insures a pause in new situations, preventing premature action upon the appearance of the first idea; that provides for the child a rich and wide experience which is so organised as to be available for the solution of the new situation; that puts the solutions thus attained to the crucial test of practice, and that perfects, by reducing to habits, the forms of response thus attained.*

QUESTIONS AND TOPICS FOR FURTHER STUDY.

1. Would you say that association is essentially a physiological phenomenon? Is there anything in the nature of an idea that can bind it to another idea?
2. Explain fully the statement that the basis of association is in the nervous system.
3. Give specific illustrations to show how a knowledge of the law of association may be applied to classroom work.
4. Can a teacher direct the pupil's line of thought by suggestion?
5. What is meant by the two worlds, *inner* and *outer?*
6. One can easily make both qualitative and quantitative studies

of association. A test in the free flow of ideas, known as the "uncontrolled association test," can be given as follows: The class is told to write down as fast as possible all the words that come to mind, starting with a certain word given by the instructor. Three minutes may be allowed for the test. And any word will do to start with. In a test given to the author's class the first word was *work*. The average number of words written by the class was 54, the smallest number by any person was 16, and the largest was 92, the mean variation being 12. The list of words written by one student was as follows: work, wood pile, ax, chop, chip, carry, burn, run, jump, fight, school, building, new, home, summer, book, money, canvass, failure, work, school, bell, class next hour, lesson, extra work, grade.

7. In "controlled association" three tests may be used—the *genus-species* test, the *part-whole* test, and the *opposites* test. The genus-species test may be given as follows: Give the members of the class a list of words, with instructions to write examples of the class named by each word. Make the time so short that no one can finish the list. The following list may be used: (1) mountain, (2) city, (3) weed, (4) metal, (5) furniture, (6) machine, (7) author, (8) planet, (9) river, (10) book, (11) ocean, (12) fruit, (13) country, (14) animal, (15) bird, (16) food, (17) lake, (18) poet, (19) college, (20) statesman.

8. The part-whole test may be given as follows: Provide the members of the class with a list of words that name parts of wholes. The students are to write the name of the whole of which the word is a part. To illustrate, for *finger*, one might write *hand*. The following list may be used: (1) window, (2) leaf, (3) pillow, (4) button, (5) nose, (6) smokestack, (7) cogwheel, (8) cover, (9) letter, (10) sepal, (11) page, (12) cob, (13) axle, (14) joist, (15) blade, (16) sail, (17) coach, (18) cylinder, (19) beak, (20) stamen.

9. For the opposites test the following list from Whipple's Manual may be used: (1) good, (2) inside, (3) slow, (4) short, (5) little, (6) soft, (7) black, (8) dark, (9) sad, (10) true, (11) dislike, (12) poor, (13) well, (14) sorry, (15) thick, (16) full, (17) peace, (18) few, (19) below, (20) enemy. Make the time so short that no one can finish. One difficulty with giving these association tests to a class is that ideas may come faster than they can be written down. If it is possible to give the tests to individuals, the associated word may be spoken and the experimenter takes the time required by the subject to give a word for each in the list.

10. The following words are good for a qualitative study of association and for noting the factors, recency, frequency and mental "set:" truth, school days, mother, picnic, duty, childhood, Christmas, teacher, kite, garden, ball, death, moonlight, railroad, poem, summer, lake, hope. The list may be slowly read and the subject given time to note down the train of ideas set up by each word. What do you learn from the experiment?

11. The class can make a study of imagination by noting what kind of images, whether of memory or imagination, are aroused by such words as the following: fountain, dove, tree, woman, angel, fairy, Caesar, father, garden, thunder, heaven, apple, train, mountain.

12. An interesting study of imagination can be made by noting the images aroused by ink-blots. A set could be mimeographed for class use. Whipple has prepared a standard set which can be had from Stoelting of Chicago.

13. How can we tell whether or not animals have images or ideas?

14. Show in what sense and to what extent one may be trained in imagination.

15. What differences are there in the imagination of children and older people?

16. What should be the attitude of the high school toward imagination?

17. Look at some pictures and make an introspective study of your experience. Make a similar study of some short poem. For example, try *The Village Blacksmith*, *The Chambered Nautilus*, *The Last Leaf*, parts of *The Vision of Sir Launfal.*

18. Is imagination limited by experience?

19. Is there any relation between imagination and intelligence?

20. The members of the class should make an introspective study of reasoning. This can be done by putting various situations before them. For example, in speaking of the songs of the male and female birds, Lowell says "He sings to the wide world, She sings to her nest; In the nice ear of nature, Which song is the best?" Answer. Is it ever right to steal? Is a parent ever justified in forsaking a child on account of the misconduct of the child?

21. What are abstractions, and how do they originate?

22. What is meant by the statement, "Teach a child to think for himself?"

23. What is meant by "originality" in thinking?

24. Is it true that many great discoveries are made in science by men who have had little experience or training in the field of the discovery?

25. Logic speaks of *deductive* and *inductive* reasoning. Show that, from the point of view of this chapter, they are essentially the same.

26. What characterizes a genius as to his association and reasoning?

27. What can a teacher do toward enlarging the experience of the child? Should his efforts be limited to the classroom?

28. Suppose a situation or problem is presented to a person, and he cannot solve it. What is the trouble?

29. Give an example of inadequate experience leading to a wrong conclusion. An example where haste does the same.

30. Does mathematics, or anything else, develop a general reasoning capacity that can function universally?

31. To what extent should a child be encouraged to accept conclusions not based on his own direct experience?

32. How is it possible for two people to have an argument and fail to come to an agreement?

33. Do dogs, horses, cats and monkeys think? Do they reason?

REFERENCES.

FOR SYSTEMATIC TREATMENT:

E. B. Titchener, *Experimental Psychology of the Thought Processes*, 1909, *Textbook of Psychology*, 1910, on Association, p. 374 ff., on Imagination, p. 416 ff., on Thought, p. 505 ff.; W. B. Pillsbury, *The Psychology of Reasoning*, 1910, especially Chs. I, II and III, *Essentials of Psychology*, 1911, on Association, p. 135 ff., on Imagination, p. 213, on Reasoning, Ch. IX; E. L. Thorndike, *The Elements of Psychology*, 1905, Chs. XVI and XVII; J. R. Angell, *Psychology*, 1908, on Imagination, Ch. VIII, on Reasoning, Chs. X, XI and XII; J. Dewey, *How We Think*, 1910, Pt. 1; W. James, *Principles of Psychology*, 1896, on Association, Vol. II, Ch. XIV, on Imagination, Vol. II, Ch. XVIII, on Reasoning, Vol. II, Ch. XXI.

ORIGINAL STUDIES:

H. L. Brittain, *A Study of Imagination, Ped. Sem.*, XIV, 1907, p. 137; W. H. Burnham, *Individual Differences in the Imagination of Children, Ped. Sem.*, II, 1893, p. 204; M. W. Calkins, *Association*, in *Psych. Rev., Mon. Sup.*, 1896, Vol. I; S. S. Colvin and E. J. Meyer, *Imaginative Elements in the Written Work of School Children, Ped. Sem.*, XIII, 1906, p. 82, *The Development of Imagination in Schol Children, Psych. Rev., Mon. Sup.*, Vol. XI, 1909, No. 44; W. L. Gard, *A Preliminary Study of the Psychology of Reasoning, American Journal of Psychology*, XVIII, p. 490; W. Libby, *The Imagination of Adolescents, American Journal of Psychology*, Vol. XIX, p. 249; T. Okabe, *An Experimental Study of Belief, American Journal of Psychology*, Vol. XXI, 1910, p. 563; C. W. Perkey, *An Experimental Study of Imagination, American Journal of Psychology*, Vol. XXII, 1910, p. 422; R. R. Rusk, *Experiments on Mental Association in Children, British Journal of Psychology*, Vol. III, 1910, p. 349; R. S. Woodworth and F. R. Wells, *Association Tests*, in *Psych. Monographs*, No. 57, 1911.

Chapter XVI.

FATIGUE.

The nature of fatigue.—It is difficult to give an exact definition of fatigue because of the complexity of the phenomena and variations of the attending circumstances. Offner* defines it as a "condition of our organism that is developed by long continued work, and that, in addition to other symptoms, is characterised in particular by a reduction in capacity for, and pleasure in, work." While this definition holds true in general, complicating conditions may make action pleasurable till the organism is exhausted and enable the individual to work at least for a short time without showing any decrease in efficiency.

We speak of fatigue as *mental* when there is incapacity for mental work, and *bodily* when there is incapacity for bodily work. The symptoms of fatigue for bodily work are, (1) acceleration of circulation and respiration, except that in intense effort the reverse may be true; (2) an increase of bodily temperature, and (3) a reduction in capacity for work. As fatigue increases, and especially when it becomes excessive, there is (4) a lowering of mental functioning. This shows that physical work unfits us for mental

**Mental Fatigue*, translated by Professor G. M. Whipple. An admirable statement and discussion of the experimental work on fatigue. The reader is referred to it for a fuller treatment of the subject.

work. "Even serious mental disturbances have been observed as a consequence of bodily exhaustion." (Offner, p. 9.) (5) In the final state of fatigue there is pain in the physical organ that is being exercised.

As a consequence of the bodily activity, there is produced in the muscles that are exercised certain poisons, known as fatigue poisons, such as lactic acid and potassium phosphate. If these poisons are taken from a fatigued muscle and injected into a fresh muscle, the phenomena of fatigue appear in the fresh muscle. Mosso* took the blood from a fatigued dog and injected it into the veins of a live, unfatigued dog, and thereby produced fatigue phenomena in the live dog. Physical activity, in addition to producing fatigue substances, also causes the fat and muscle substance to be consumed in producing the muscular energy. This is because dissimilation proceeds faster than assimilation. It is possible, with short pauses for rest, to keep the fatigue poisons eliminated, at least partially, until finally exhaustion, due to the consumption of the muscle substance, ensues. The replenishing of these consumed materials is accomplished by nutrition, rest and sleep. During rest and sleep the fatigue poisons are eliminated and the tissue is restored.

The effects or symptoms of mental fatigue are: (1) Lowering of the quality and then the quantity of work. (2) Fluctuations of the attention, shown in the difficulty of pursuing a line of work. (3) Sensitivity and discrimination decrease. (4) The capacity of the voluntary muscles for work is impaired, just as in bodily fatigue capacity for mental work is im-

*A. Mosso, *Fatigue*, 1904, p. 119. (English translation.)

paired. The involuntary muscles are also affected. (5) Respiration changes, becoming first shallower and faster, then deeper, and in excessive fatigue shallower and faster again. (6) The pulse becomes faster and the head becomes hot on account of the increased supply of blood in the brain. The conscious symptoms are disinclination for work, then weariness, then exhaustion with headache. To express the fatigue effects in terms of ability or capacity to learn one can say that, as fatigue comes on, learning is slower and more inaccurate. The same fatigue poisons are produced as in bodily fatigue.

The measure of fatigue.—In the first place, we must say that we can not rely upon the subjective symptoms of fatigue. One's feeling of fatigue is no reliable indication that there is fatigue. It has been shown that fatigue affects both mental and physical capacity. There are accordingly two methods of measuring the amount of fatigue: (1) by determining the decrease in physical efficiency; (2) by determining the decrease in mental efficiency. The first is known as the *physiological* method, which has several forms. The decrease in muscular force and efficiency may be determined by the use of the dynamometer, or the ergograph, or by testing the tapping rate of the subject,—the speed of tapping with the finger on a telegraph key decreases with fatigue. Fatigue may also be determined by testing the range of accommodation of the eye,—the range of accommodation increases with fatigue. And still another method is by noting the changes in circulation and respiration. These various physiological methods have some value, but are, on the whole, inadequate.

Much more reliable are those methods that measure fatigue by determining the decrease in mental efficiency.

The psychological methods.—These methods undertake to determine the amount of fatigue, either by measuring the decrease in sensitivity or sensory discrimination, or by measuring the decrease in efficiency in performing some kind of mental work. We shall describe briefly the more important tests. (1) *Esthesiometry.* This method evaluates fatigue by measuring the two-point limen for compass points on the skin. In general, with fatigue, the two points when placed upon the skin simultaneously and with equal pressures are perceived as one at a wider degree of separation than when the subject is not fatigued. This test is, however, very difficult of application. Various other methods of determining sensory limens and discrimination have been used, but none so carefully worked out as the esthesiometric method. (2) *Simple computation.* Easy examples in addition or multiplication are given to the pupils for ten-minute periods hourly through the day. There is found an increase of speed, due to practice, but an increase in errors and corrections due to fatigue. In general, we may say that this test consists in giving a series of easy problems to be worked out at the highest rate of speed. Fatigue is indicated by an increase in the amount of errors. (3) *Memory method.* This method consists in determining the immediate memory span for digits or words. Fatigue is indicated by a decrease in the immediate memory span. Practice, however, is likely to offset the effect due to fatigue. If the prac-

tice effects be eliminated, this is a most valuable method, for immediate memory span and ability to learn are closely associated, and are affected by anything that affects the condition of the body. By training for a week or two, the immediate memory span could be brought to near its maximal efficiency; then this test of fatigue could be used with considerable confidence. (4) *The completion method.* This test consists in requiring children to fill out sentences in which words and syllables have been omitted. The nature and number of errors and corrections is an index of fatigue, the quality of work done being inversely proportional to the amount of fatigue. The difficulty of the method is in finding an even material for successive tests. (5) *Cancellation method.* Pupils are required to cancel out certain words or letters from a page of printed matter, allowing a specified time for the work. It is difficult to get material that has an even distribution of the words or letters. Moreover, practice works here also to offset fatigue. (6) *Copying method.* The teacher writes on the board different combinations of the letters a, e, i, o, u, r, v, n. The pupils are given a certain time, say five minutes, in which to copy them. The number of mistakes and corrections indicates the amount of fatigue. (7) *The combined method.* (a) The pupils are required to count the letters in each of the first five lines on a page of their school reader. (b) They are required to add or subtract several pairs of two-place numbers written on the blackboard and to write the answers on paper. (c) The teacher recites six one-to-three syllable words, or four one-to-two place numbers, or the words or numbers may be written

upon the blackboard and immediately erased. After seeing or hearing them the pupils write down as many as they can remember. (d) The pupils are given sheets on which are printed 100 words and 50 figures containing those used in test (c). They are required to underline those that had been given in the previous test. This tests recognition, (a) and (b) test attention, and (c) tests immediate memory span. (8) *Continuous work method.* This test consists in giving the same form of work for some time. A curve can then be plotted from the data showing the course of efficiency for the whole period. A good form of the test is the solution of easy problems in addition or multiplication for ten-minute periods, with five-minute periods for rest, continuing thus to work and rest for one or two hours. Fatigue is indicated by the number of errors and corrections. The speed may increase for at least a part of the period on account of practice. When the actual school work can be treated quantitatively, it may serve as the material for this test.

Some combination of methods such as that in (7) will doubtless be best for the teacher to use in determining the course of fatigue throughout the day or for different school subjects. Simple addition or multiplication, copying, cancellation and immediate memory tests would be a good combination. Whatever the tests and combinations used, the teacher must be careful to watch for complicating circumstances, such as the practice effects.

Complicating phenomena.—*Practice effects.* The above caution concerning the effects of practice leads us to a consideration of several phenomena that are

likely to be associated with fatigue. Practice always works in opposition to fatigue. If a task is performed at several times during the day, practice increases one's efficiency in the later periods. Another interesting phenomenon is *habituation*. One has less and less fatigue as one becomes skilful at his work. Habituation, then, reduces the amount of fatigue produced by the same performance. A somewhat similar phenomenon is known as *warming-up*. One can seldom do his best work at the very beginning of a task. Efficiency improves as one comes into the swing of his work. This rapid initial increase of efficiency is 'warming-up,' and is evident in practically all work. Another temporary variation is the *spurt*, which may occur at any time during the progress of a task, and is especially likely to occur near the end of the performance. It is due to the release of some additional energy not available throughout the performance of the task. As one nears the end of a piece of work, for example, the idea that the end is near serves as additional motive and a consequent release of energy results. This phenomenon is similar to the effect of a pace-setter in a race. These four factors must always be taken into account,—habituation, practice effects, warming-up and spurts.

The three phases of fatigue.—There are usually three stages of fatigue: (1) In the first stage, the speed of work may increase, but the quality decreases. (2) In the second stage, the quantity, as well as the quality, decreases. (3) In the third stage, exhaustion comes for some individuals, but in others there comes an increased excitement which enables them to do hurried and irregular work, but this is

followed by exhaustion. These three stages are not always found, however, for there are individual variations. Four types of workers have been made out. These types have been named from the form of curve that indicates their working efficiency. The first is known as the *falling* type; the work curve of this type shows a steady decrease of speed and increase of errors. The *rising* type shows a steady decrease in the number of errors. The *convex* type shows an initial decrease of errors, then a steady increase. The *concave* type shows an initial increase, then a steady decrease of errors. Then, in addition to these different types, there are variations in fatiguability due to health and to age. The young are very easily fatigued, as are also those suffering from disease or illness, particularly from some neurotic disease. There is a pretty steady increase in ability to resist fatigue up to the age of puberty, setting in a year or two earlier for girls than for boys.* It is therefore argued that the work of adolescents should be lessened. And, since this period starts in earlier for girls than for boys, girls and boys should not be educated in the same classes. For at first, the boys are able to do more work, and later on they are more easily fatigued than are the girls. This greater fatiguability at the beginning of adolescence or preceding it is borne out by the decreased resistance to disease. President Hall says: "From thirteen to fifteen great reduction of school work for both sexes, but chiefly for boys, should be insisted on. No one should be allowed to go to school at all without nine hours of sleep and a hearty appetite, for even pres-

*For a discussion of this point, see Offner's *Mental Fatigue*, p. 78.

ence in school impairs nutrition, arrests growth, starts neurotic habits and especially checks the development of the higher powers, which are the last to unfold.'"*

Length of school sessions and school periods. — How long should a recitation period be? How long should a school session be? These questions can not at present be answered with certainty. And, indeed, the length of school periods should never be definitely and absolutely fixed because of the varying circumstances which produce fatigue. There is no good reason why a lesson period or a school session might not be shortened when the nature of the work or weather conditions are such as to bring on fatigue unduly early. However, there must be a length of period best suited, on the average, for children of the various ages. But there are not sufficient data at present for determining this average for children of the different ages or grades. This is a problem in school hygiene that demands immediate solution. Pending its solution by careful, scientific procedure, teachers can, by using the tests above described, determine provisionally the best length of lesson period and of school session. It seems safe to say, in the light of our present knowledge, that the present sessions are too long, at least for the younger children. From nine o'clock till twelve, with fifteen minutes intermission, is entirely too long for children of the lower grades, and there should be only a very short afternoon session for the younger children, or none at all. Of course, the proper length of a school session depends much on the nature of the work done

*G. S. Hall, *Adolescence*, 1904, Vol. I, p. 243.

and the length and frequency of the pauses. Even the proper length of a recitation depends much on the teacher and the nature of the subject. The teacher who is capable of keeping the children working at high pressure should have shorter periods and more frequent pauses than the teacher who gets work only at low pressure. These pauses should be spent in rest, and it is not rest to spend the time at some other hard mental work or at vigorous athletic or gymnastic exercise. If there is any play at rest time, it should be very light. Or, if children play hard at recess time, there should be a short time after recess for rest before the hard work of school begins. For it must not be forgotten that fatigue is *fatigue, however caused.* It is also more or less general, for the circulation scatters the fatigue poisons over the body, and it is also probable that the part of the body used drains the other tissues of energy supplying substance. It is no real rest, then, to turn from one kind of hard work to another, whether the work be mental or physical. It is true, of course, that one can turn from one kind of work to a different task and do the new work with more efficiency for a time. This is due to the novelty of the new work, to interest. The old subject or task becomes monotonous and there is no longer sufficient motive to bring about good work. With the new subject or task there comes a new motive, and one can work at higher pressure, perhaps, for a short time, much as is the case when one nears the end of a task. In the latter case, and in spurts generally, there is temporarily additional energy released, making for better work even without changing to a new task. This can be true because of a motive that makes possible

the use of additional energy, and in the case of change of task may be due to the fact that fatigue is to some extent local, in that it takes time for it to affect the system generally. Offner says, in discussing the question of special and general fatigue: "Change of work also brings about recuperation oftentimes. If we mean by this statement that, when we resume a task that we have interrupted by some other form of activity, we then work considerably better than before the interruption—that, to speak more accurately, we enter upon the task again with a fresh supply of energy—then the statement is very much to be doubted. It can not be supposed that in our complicated psychophysical organism an activity of appreciable intensity can run its course in any part without thereby affecting the functions of the other portions of the organism, and hence of the whole organism. Conversely, the less the active part be connected with the remainder of the organism, the more is it possible to limit its functioning to itself, the more slowly will the fatigue spread to the other parts, and the more possible will it be for the fatigue to take on the semblance of localised and isolated fatigue. * * * There is, then, such a thing as *special fatigue,* which we must look upon as a consumption of the constitutive material of the active organ—a process that in the very nature of the case is limited to the organ in question—and as a secretion of fatigue substance that accumulates at first at the point where the work is done. Nevertheless, there is *no isolated fatigue.* The fatigue substances do not remain where they are secreted, but are car-

ried forth through the whole body by the ceaseless circulation of the blood.''* The more specialised a piece of work is, then, the more slowly does fatigue become general. There is, indeed, local fatigue, but it is only a temporary stage, and general fatigue always ensues if the work is continued. In fact, at the beginning of the learning process in acquiring some new skill, it makes no difference how restricted the performance,—general fatigue comes quickly. A few years ago the author had occasion to learn the point alphabet of the blind. It was a terrible process, and he had to rest every fifteen minutes, and was quite exhausted at the end of an hour's work. When children are learning to draw and to write they doubtless suffer even greater fatigue.

The pedagogy of fatigue.—The question of fatigue is of tremendous importance to education. If one is acquiring a new skill, it is high pressure work that is effective. In intellectual work, in acquiring new ideas, in memory work, in thinking, it is always attentive, high-pressure work that counts. Not only is this true in an individual task, but improvement is dependent upon work at the top of efficiency. In an experiment recently conducted by the author, two girls improved in learning capacity for four months, while a third made no improvement because she worked at low pressure. The work that counts most is the work that is done under the most favorable physical conditions. As far as any improvement is concerned, drill work should stop short of considerable fatigue, should stop as soon as fatigue is notice-

*M. Offner, *Mental Fatigue*, 1911, p. 94 ff.

able. And as far as economy of work is concerned, there is little use in trying to learn after fatigue has become considerable. But, of course, there are times when one must disregard economy, when one must work to the point of exhaustion; and as children grow older it should be part of their training to carry on work in the face of fatigue. It should be work, however, at which they are skilful and in which they have power; it should not be in the initial stage of learning or of skill. Every adult who amounts to anything must work almost daily to the point of exhaustion, and it would be a poor education that did not give training in endurance. The important thing here is that the teacher know the conditions of work and of fatigue. The children must have time to recover from fatigue, rest pauses during the day and sufficient sleep at night, with frequent vacations. The school year should not leave the child exhausted. The school ought to be of such a nature that it would promote the health and growth of the child. A properly conducted school ought to leave the child in as good physical condition at the end as it was in the beginning. This can not be true if the work is so hard and the rest and sleep so little in amount that the child can not recover from fatigue day by day. The wise teacher will so distribute the work and play and rest as to get the best work out of the pupils and at the same time maintain the best of health. Sleep is a very important factor in maintaining health. A child seven to nine years old should have eleven hours sleep, from the age of ten to thirteen there should be ten hours of sleep, and at least nine hours sleep for adolescents.

QUESTIONS AND TOPICS FOR FURTHER STUDY.

1. Should a child be allowed to sleep till it naturally awakens?
2. Is school work done by a child when mentally fatigued of any value?
3. Take some poem that has stanzas of equal length and try committing to memory when very much fatigued. Commit to memory an equal amount under good conditions and compare the results.
4. Similarly test your memory for ideas.
5. Does the reading of interesting fiction rest the mind after fatigue from hard work?
6. Can a person who is fatigued from several hours of mental work play ball as well as when not so fatigued? Test the matter.
7. Athletes often do poorly in school work. Is it because they use up all their energy in muscular work and have none left for mental work?
8. What do you consider a proper distribution of mental and physical work for a university student? Make a plan showing this distribution.
9. Why is it that a student should have plenty of physical work or play if muscular activity brings on fatigue that lessens one's ability to do mental work?
10. Test out for yourself the matter of general and special fatigue for both mental work and physical work. Try learning one subject after being fatigued by another. Try doing one kind of muscular work after being fatigued by another.
11. Do girls fatigue more easily than boys?
12. Do one's interest and cheerfulness in his work have anything to do with fatigue?

REFERENCES.

T. Bolton, *The Reliability of Certain Methods for Measuring the Degree of Fatigue in School Children*, in *Psychological Review*, Vol. vii, 136; A. C. Ellis and Maud Shipe, *A Study of the Accuracy of the Present Methods of Testing Fatigue*, in *American Journal of Psychology*, Vol. xiv, 496; W. James, *The Energies of Men*, in *Philosophical Review*, Vol. xvi, 1; F. S. Lee, *The Nature of Fatigue*, in *Popular Science Monthly*, Vol. lxxvi, 182; H. D. Marsh, *The Diurnal Course of Efficiency*, Columbia University Dissertation, New York, 1906; A. Mosso, *Fatigue*, English Tr., New York, 1904; W. B. Pillsbury, *Attention Waves as a Means of Measuring Fatigue*, in *American Journal of Psychology*, Vol. xiv, p. 541; C. E. Seashore and G. H. Kent, *Periodicity and Progressive Change in Continuous Mental Work*, *Psych. Rev., Mon. Sup.*, Vol. vi, No. 28, 1905; W. S. Christopher, *Chicago Public School Report on Child-Study Investigation*, 1898-99, p. 38; F. W. Smedley, *Report of Child-Study and Pedagogic Investigation*, Chicago Public Schools, No. 2, 1899-1900, p. 64 ff.; E. L. Thorndike, *Mental Fatigue*, in

Psych. Rev., Vol. vii, 466; *Journal of Educational Psychology*, Vol. ii, 61; F. L. Wells, *Normal Performance in the Tapping Test Before and During Practice, with Special Reference to Fatigue*, in *American Journal of Psychology*, Vol. xix, 437; J. H. Wimms, *The Relative Effects of Fatigue and Practice Produced by Different Kinds of Mental Work*, in *British Journal of Psychology*, Vol. ii, 153; W. H. Winch, *Some Measurements of Mental Fatigue in Adolescent Pupils in Evening Schools*, in *Journal of Educational Psychology*, Vol. i, 13; W. R. Wright, *Some Effects of Incentives on Work and Fatigue*, in *Psych. Rev.*, Vol. xiii, 23; C. S. Yoakum, *An Experimental Study of Fatigue*, *Psych. Rev., Mon. Sup.*, No. 46, 1909.

For extensive bibliography see Whipple's translation of Offner's *Fatigue*, p. 122 and p. 128.

Chapter XVII.

TESTS AND NORMS.

Before we can deal intelligently with children we must have accurate information concerning their mental and physical natures. In this country, in the last few years, much progress has been made in the direction of medical inspection, although very little has been done in the way of mental and physical tests. And even what has been done in medical inspection has not borne proper fruit, because, in most cases, notifying the parents of the conditions found and the publication of the statistical results was all that came of the inspection. Now, what is needed is something like the following: When a child enters school for the first time, accurate information should be obtained concerning its home and parents, accurate physical measurements and tests should be made, including a careful medical examination, and there should be such mental tests as it is possible to give. The data obtained should be recorded. The different forms of examination and tests should be repeated every six months during the school life of the child, and all the data recorded and as carefully kept as are the records at the court house. The medical data should be obtained by a school physician, the mental and physical data can be obtained by the

teachers, but the tests ought to be under the direction of a psychological expert.

For this work to be most valuable the tests given should be uniform throughout the country, and should be kept in similar form, so that when a child moves from one school district to another his record could be mailed to his new superintendent and would be perfectly intelligible. To make this possible there ought to be a national commission or committee to prepare the various mental tests from year to year and prescribe the methods of giving them and of keeping the data. Such data carefully obtained and recorded would be of inestimable value to the teachers of our schools in the actual teaching, and would at the same time be of great worth to the science of education. In the meantime the author suggests the following tests and forms of record. The records could be kept on heavy paper, 8 in. by 11 in. The mental, physical and school records could have 26 columns from top to bottom, allowing for 24 semi-annual examinations and two extra spaces. The medical record sheet should have 13 spaces from top to bottom and be ruled also on the back. Then there should be one sheet for the entrance record. This plan would require five sheets for a child's complete record throughout its school life. The leaves could have perforations and be kept in the form of a loose-leaf note book, or they could be kept on the order of a card catalogue. The reverse sides of the mental and physical record sheets should be used for recording additional data not properly covered by the for-

mal headings. The reverse of the school record sheet should contain the names of all the child's teachers, with the dates when they had charge of the pupil.

Now, as to the data and methods of getting it: The headings of the medical record are self-explanatory. The mental and physical tests should be performed, on the whole, as prescribed in G. M. Whipple's *Manual of Mental and Physical Tests.* The *Grip* should be determined by the use of a Smedley dynamometer. The *Tapping rate* should be indicated by the number of taps in 30 seconds, determined by the use of a tapping instrument and described in Whipple's *Manual,* p. 100. The *Lung capacity* (also termed *vital capacity*) should be determined by the use of a *wet* spirometer. The *height* should be determined by the use of a stadiometer, the *weight* by the use of accurate scales. The *visual acuity* can be determined by the teacher by the use of *Test type,* and should be recorded in the ordinary form used by oculists,—to illustrate: If a child reads at 20 feet distance the letters that a normal eye can read at 40 feet distance, the visual acuity should be recorded as 20/40. The *auditory acuity* may be determined by the watch test and could be recorded in similar form. To illustrate: Take the average of the class as the denominator of the fraction and the actual distance at which the child can *just* hear the watch tick as the numerator. But the best way to test hearing is by the use of a Pilling-McCallie audiometer.

The best form of mental tests must be worked out by extensive experiments with school children as well

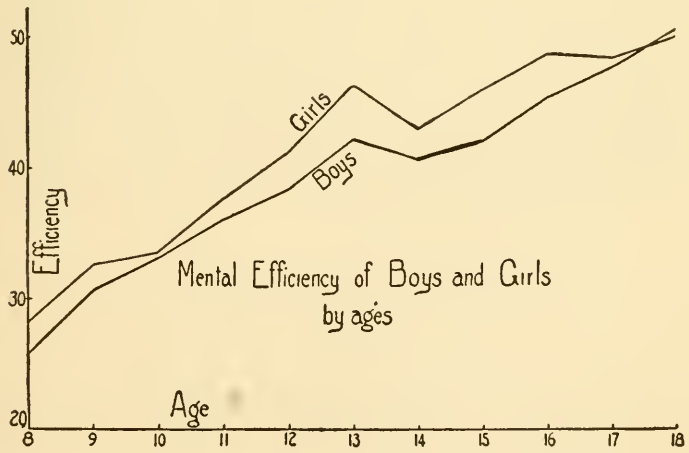
as with adults. A good test is one that is simple, easily given and easily graded, and that gives a high correlation with other tests. After giving various tests to several thousand school children and to a small number of adults, I recommend, provisionally, the followings tests and procedure as fulfilling the above requirements: For *attention,* the "A" test as described in Whipple's *Manual,* p. 254. The time allowed for the test was one minute. Whipple's formula for determining efficiency was used and the result divided by eight, to reduce the grade to about the same scale of the other grades, as shown in the accompanying table. For *association* should be used Whipple's test for uncontrolled association and the three controlled association tests, namely, the *part-whole,* the *genus-species* and the *opposites* test. These tests are described in Whipple's *Manual* under tests 33 and 34. The time allowed for the uncontrolled association test was 3 minutes, for the genus-species test, 45 seconds, for the part-whole test, 30 seconds, and for the opposites test, 90 seconds. The grade recorded in the table for association is the sum of the four results of these separate tests. For *rote memory,* the words given on p. 204 in this book can be used. In grading, allow one point for each word and one point for its correct position. Add up the points for both abstract and concrete memory and divide by 2, to obtain the grades as recorded in the table. For logical memory, Whipple's *Marble Statue* test may be used,—described in the Manual, p. 397. One point is allowed for each idea correctly reported

by the child. The sum of these points gives the grade as recorded in the table. Of course, this test cannot be used a second time with the same pupils. This is true for most of the mental tests, and they will, therefore, have to be replaced from year to year. For *imagination,* the *ink-blot test,* Whipple's *Manual,* p. 430, may be used. The children are allowed one minute to write the things that are suggested by each ink-blot. The grade recorded in the table is the total of all the objects suggested by the blots. This test is better as a qualitative study of imagination than it is as a quantitative determination of imaginative capacity. Since the test was not given to many subjects, the grades of boys and girls are combined. A somewhat different test of imagination, especially of what is known as constructive imagination, is the word-building test, described by Whipple in the *Manual,* p. 441, and recorded in our table as *invention.* In the latter test we used both lists of letters, a, e, o, b, m, t and e, a, i, r, l, p. Five minutes were allowed for each list, and the grade given in the table is the sum of the words written in the two tests. For *learning,* Whipple's two substitution tests, A and B, are used. The method of giving the tests, however, was not that described by Whipple, but modified as follows: The pupils were given test form A and allowed eight[1] minutes to fill in the blanks. At another time they were given test form B and allowed eight minutes to fill in the blanks. In grading the work, one point was allowed for each blank correctly

[1]This time has proved too long for the older pupils, 10 minutes for the younger and 5 for the older pupils would be better. The number of characters per minute might be taken as the grade.

filled in. Add together the grades for the two tests and divide by 2 to get the results recorded in the table. This is one of the best of all the tests, easily given, easily graded, and it is a good criterion of a pupil's ability. The school records should be recorded in the form of rank, the one making the highest record being ranked 1, the next highest 2, and so on. Or better still would be to take the actual grade of the pupil and transfer it to a basis of an average of 50. This can be done by dividing 50 by the actual average of the class and then multiplying by the actual number of units accomplished by the pupil tested. This method really combines in one number both grade and rank.* In the mental tests the actual standing of the pupil can be recorded and compared with the table (pp. 260-261).

*See A. P. Weiss, *On Methods of Mental Measurement, Especially in School and College*, in *Journal of Educational Psychology*, Vol. II, p. 555.



NORMS OF MENTAL CAPACITY.

Boys.

Age	8		9		10		11	
Tests:	No.	Av.	No.	Av.	No.	Av.	No.	Av.
Learning	9	27.0	35	27.0	30	27.5	40	34.6
Logical memory	61	23.9	75	31.0	92	31.0	103	33.2
Rote memory	5	29.0	30	37.9	30	52.5	50	47.5
Attention, A test			20	23.3	10	24.4	28	31.6
Association	10	25.6	37	31.6	31	38.4	37	42.1
Imagination ink-blots	2	23.5	20	46.6	25	40.5	45	43.5
Invention			17	17.5	11	17.5	19	19.7
Total mental efficiency		25.8		30.7		33.1		36.0

Girls.

Age	8		9		10		11	
Tests:	No.	Av.	No.	Av.	No.	Av.	No.	Av.
Learning	29	20.0	54	31.5	30	31.3	49	38.2
Logical memory	46	26.7	86	31.8	87	34.3	115	35.6
Rote memory	16	29.0	38	37.0	37	42.0	67	39.5
Attention, A test	18	16.0	24	28.0	21	30.0	26	38.0
Association	28	27.6	50	35.7	35	38.7	46	48.5
Imagination ink-blots	2	23.5	20	46.6	25	40.5	45	43.5
Invention			17	17.5	11	17.5	19	19.7
Total mental efficiency		28.2		32.6		33.5		37.6

NORMS OF MENTAL CAPACITY.

Boys.

12		13		14		15		16		17		18		Gen.
No.	Av.	No.	Av.	No.	Av.	No.	Av.	No.	Av.	No.	Av.	No.	Av.	Av.
27	39.3	33	39.5	46	46.1	10	46.0	5	47.2	16	49.0	8	48.0	39.2
109	36.5	111	38.5	94	37.5	63	37.4	42	36.6	35	37.1	19	40.7	34.8
56	40.0	56	42.5	55	43.5	35	44.2	36	47.2	29	49.5	11	54.0	44.3
13	39.0	21	39.0	19	51.1	11	55.0	10	64.1	9	62.0	4	70.5	46.0
21	46.4	48	47.2	32	52.3	12	55.8	17	54.8	16	68.1	8	72.7	48.6
21	43.8	39	62.0	12	31.5	12	31.5	12	34.2	14	33.3	11	31.0	38.3
16	23.1	14	25.8	21	22.2	18	24.0	16	33.6	21	34.5	11	35.8	25.3
	38.3		42.1		40.6		42.0		45.4		47.6		50.4	39.5

Girls.

12		13		14		15		16		17		18		Gen.
No.	Av.	No.	Av.	No.	Av.	No.	Av.	No.	Av.	No.	Av.	No.	Av.	Av.
41	44.2	41	46.2	42	48.0	23	46.3	2	50.0	16	46.3	9	48.7	40.9
134	38.0	117	40.1	107	40.2	77	41.0	70	39.7	58	39.4	25	42.1	37.2
64	41.0	59	43.0	78	44.5	49	46.7	63	46.8	51	51.5	20	52.7	43.1
20	45.2	16	51.3	23	55.7	13	68.0	13	70.2	16	62.3	8	64.9	51.3
39	52.6	38	49.6	38	58.3	18	63.3	23	65.6	32	70.9	16	74.3	53.2
21	43.8	39	62.0	12	31.5	12	31.5	12	34.2	14	33.3	11	31.0	38.3
16	23.1	14	25.8	21	22.2	18	24.0	16	33.6	21	34.5	11	35.8	25.3
	41.1		45.4		42.9		45.8		48.6		48.3		49.9	41.3

ENTRANCE RECORD.

The record on this page is to be filled out when the child first enters school, and should be made as complete and accurate as possible. Besides the information called for, any other facts may be added. And later such facts should be added as the death of a parent, removal from one city to another, etc. And the date when the child has the various children's diseases should be entered here, together with the permanent effects of such diseases.

Date of birth: Yr.....Mo.....Day.....
Name in full.....
Place in family.....(1st, 2nd, 3rd, etc.).
Father's name.....Year of his birth.....
Place of his birth.....Occupation.....Health.....
Mother's name.....Year of birth.....
Place of birth.....Number of children.....

MEDICAL RECORD.

Date of birth: Yr.....Mo.....Day.....
Name in full.....
Vaccination record (state whether successful).....
.....

If the child has a disease between the regular times for school inspection, the disease, with the date, should be recorded.

Date.	General constitution.	Diseases of chest and abdomen.	Diseases of spine and extremities.	Eye diseases and dioptrical defects.	Ear diseases.	Diseases of mouth and throat and speech defects.	Skin diseases.	Neurotic diseases.	Other diseases.

PHYSICAL RECORD.

Date of birth: Yr.....Mo.....Day.....
Name in full.....

Date.	Height, Cm.		Weight, Kg.	Lung capacity.	Grip.		Tapping rate.		Visual acuity.		Auditory acuity.	
	Standing	Sitting.			Rt.	L.	Rt.	L.	Rt.	L.	Rt.	L.

MENTAL RECORD.

Date of birth: Yr.....Mo.....Day.....
Name in full.....
Record standing by rank, disposition by a word.

Date.	Attention.	Invention.	Association.	Learning capacity.	Rote memory.	Logical memory.	Imagination.	Disposition or temperament.

SCHOOL RECORD.

(Standing in Branches Studied.)

Date of birth: Yr.....Mo.....Day.....
Name in full.....

The names of the various school branches are to be filled in in ink and the pupil's standing recorded in the form of rank in class, 1 representing first in class; 2, second in class, and so on; deportment as excellent, good, medium, bad, very bad.

Date.	Deportment.													

NORMS OF STANDING AND SITTING HEIGHT, IN CM. (SMEDLEY).

Age.	Standing Height. Boys.	Standing Height. Girls.	Sitting Height. Boys.	Sitting Height. Girls.
6.0	110.69	109.66	62.40	61.72
6.5	113.25	112.51	63.54	62.90
7.0	115.82	115.37	64.67	64.07
7.5	118.39	118.22	65.78	65.25
8.0	120.93	120.49	66.75	66.34
8.5	123.48	122.75	67.72	67.43
9.0	126.14	125.24	68.79	68.32
9.5	128.80	127.74	69.85	69.21
10.0	130.91	130.07	70.56	70.05
10.5	133.03	132.41	71.26	70.89
11.0	135.11	135.35	72.10	72.23
11.5	137.19	138.30	72.93	73.58
12.0	139.54	141.31	73.80	74.93
12.5	141.89	144.32	74.70	76.29
13.0	145.54	147.68	76.24	77.91
13.5	149.09	151.04	77.79	79.54
14.0	151.92	153.64	79.21	80.99
14.5	154.74	156.24	80.64	82.43
15.0	158.07	156.83	82.18	83.21
15.5	161.41	157.42	83.68	83.99
16.0	164.03	158.30	85.43	84.54
16.5	166.65	159.18	87.17	85.09
17.0	167.85	159.26	88.16	85.20
17.5	169.04	159.34	89.14	85.30
18.0	171.23	159.42	90.30	85.51
18.5	173.41	159.50	91.46	85.72

NORMS OF WEIGHT, IN KG., WITH CLOTHING (SMEDLEY).

Age.	Boys.	Girls.	Age.	Boys.	Girls.
6	19.738	18.870	13	38.084	38.974
7	21.613	20.974	14	42.696	44.219
8	23.817	23.010	15	47.993	48.161
9	26.336	25.257	16	53.238	50.652
10	28.707	27.795	17	57.384	52.386
11	31.223	30.662	18	61.283	52.923
12	34.151	34.373			

NORMS OF LUNG (VITAL) CAPACITY (SMEDLEY).

Age.	Boys.	Girls.	Age.	Boys.	Girls.
6	1023	950	13	2108	1827
7	1168	1061	14	2395	2014
8	1316	1165	15	2697	2168
9	1469	1286	16	3120	2266
10	1603	1409	17	3483	2319
11	1732	1526	18	3655	2343
12	1883	1664			

NORMS OF STRENGTH OF GRIP, IN KG. (SMEDLEY).

	Boys.		Girls.	
Age.	Rt. hand.	L. hand.	Rt. hand.	L. hand.
6	9.21	8.48	8.36	7.74
7	10.74	10.11	9.88	9.24
8	12.41	11.67	11.16	10.48
9	14.34	13.47	12.77	11.97
10	16.52	15.59	14.65	13.72
11	18.85	17.72	16.54	15.52
12	21.24	19.71	18.92	17.78
13	24.44	22.51	21.84	20.39
14	28.42	26.22	24.79	22.92
15	33.39	30.88	27.00	24.92
16	39.37	36.39	28.70	26.56
17	44.74	40.96	29.56	27.43
18	49.28	45.01	29.75	27.66

NORMS OF TAPPING RATE (SMEDLEY).

	Boys.			Girls.		
Age.	No. tested.	Rt. hand.	L. hand.	No. tested.	Rt. hand.	L. hand.
8	31	147	117	31	146	117
9	60	151	127	44	149	118
10	47	161	132	48	157	129
11	49	169	141	48	169	139
12	44	170	145	50	169	140
13	50	184	156	45	178	153
14	40	184	155	67	181	157
15	37	191	169	48	181	159
16	21	196	170	50	188	167
17	13	196	174	40	184	162
18	3	197	183	24	193	169

The records in the above table represents the number of taps in 30 seconds. The number tested, however, is so small that the table is not very reliable.

APPENDIX.

The Development of the Instincts.

If we could make out a table showing the orderly appearance of the instincts and the periods of their dominance, we could then arrange the curriculum of the schools to correspond to the instinctive activities. But the matter is not simple. The time of first appearance of the various instincts varies much according to the reported observations, and their periods of dominance vary still more. The appearance of an instinctive action, even after the structures are ready for it, depends upon the appearance of the situation that normally calls forth the particular form of response. There is a variation of a year or two in the maturing of the structures that underlie the instincts. And even after the first appearance of an instinct the future course is entirely dependent upon experience. An instinctive tendency may be early subdued, or it may be strengthened and perpetuated. The nearest we can come to a solution of the problem is to determine by statistical studies the time when, on the average, an instinctive tendency is at its height, and in some cases this may be sufficiently definite to be of value to education. But only in a broad way can the instincts determine the order of the curriculum. The individual, adaptive and environmental instinctive tendencies are all operative when the child enters school, and can be depended upon to furnish motive and initiative. The social tendencies are also operative and grow in strength steadily till maturity. The fact is that other factors are more important in determining the arrangement of the curriculum. As far as his instincts are concerned, we may teach a six year old boy about stars, bugs, flowers, weeds, stones, rivers and mountains, and wise teaching doubtless teaches something about all these things from the beginning. Since the appearance is variable, and since the strength of instinctive tendencies is dependent upon experience, and therefore varies immensely for different individuals, the teacher will have to ascertain for each individual case what instinctive tendencies will function best to furnish initiative and motive. At any rate, the instincts will have to be taken into the laboratory and worked out with a great deal more care than has ever been used in their study before we can do anything more than indicated. However, it may be worth while to give in brief form the results of various studies of instincts and the emotive instinctive responses:

Imitation.—First appearance, 59th day (reflex), 171st day (voluntary), Dearborn; in 2nd half of first year, Kirkpatrick; 6th or 7th month, Baldwin; 15th week, Preyer; 237th day, Major; 4th month, Sully. Most prominent 4th to 7th year, Kirkpatrick.

Play.—In the second quarter of first year, Kirkpatrick, Major, Shinn; 341st day, Dearborn. Normally, always operative later.

Migrating.—1st to 3rd or 4th year, Kline; 2nd or 3rd year, Kirk-

patrick; must be subdued by early adolescence or may become permanent tendency.

Collecting.—Not later than the 3rd year, Burk; in the 2nd year, Kirkpatrick. At its height at 10, Burk.

Construction.—Appears, 9th month, Sully; 13th month, Tiedemann; 14th month, Major. Interest in construction is prominent throughout school life, normally.

Rivalry.—According to Kirkpatrick, appears in the 4th or 5th year. It may be relied upon to function throughout child-life.

Sympathy.—7th and 8th month, Tracy; 12th month, Sully; 22nd month, Baldwin; 27th month, Major; 3rd year, Kirkpatrick. Later responses are largely due to experience and training.

Pride.—19th month, Preyer.

Fear.—First appears, 2nd month, Tracy and Shinn; 3rd month, Major; 4th month, Dearborn and Preyer; 7th month, Sully; 1st year, Kirkpatrick. Fear is greatest in 3rd and 4th years, according to Kirkpatrick.

Anger.—In young babies, Kirkpatrick; 10th month, Darwin and Preyer; 2nd month, Perez.

Curiosity.—22d week, Preyer. Under proper conditions, curiosity functions throughout school life.

It will be seen from the above that all the important instinctive tendencies, except the socialistic, function normally throughout the school life of the child. The strength of these tendencies depends upon the demands made upon them in the experience of the child. The older and more fundamental to the life of man the tendency, the more independent it is of experience.

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